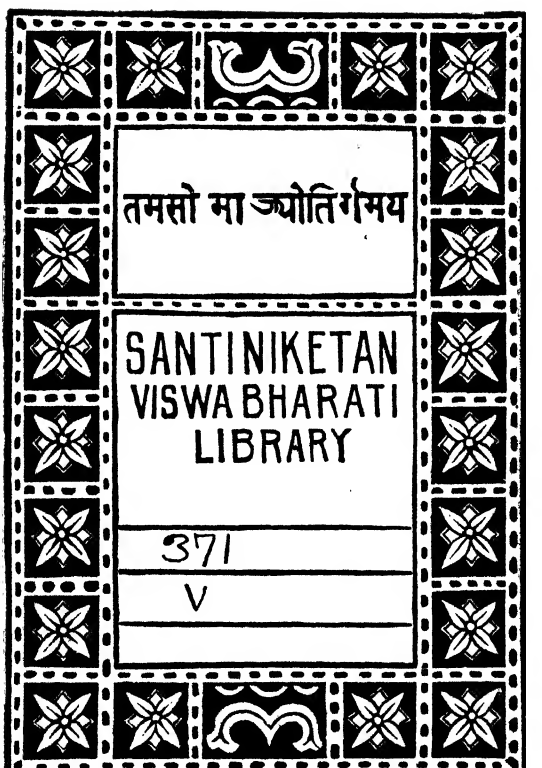
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A NEW SCHOOL IN BELGIUM

A NEW SCHOOL IN BELGIUM

BY

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TO
MY FELLOW-WORKERS
AND
TO MY PUPILS AT
BIERGES

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INTRODUCTION

I HAVE often been asked what precisely is meant by a New School, what are the essential characteristics of such an institution. Some time ago I gave a definition which did not succeed in putting an end to misunderstandings.[1] Henceforward I shall only have to refer inquirers to the book written by my friend and colleague, Faria de Vasconcellos. His school at Bierges-lez-Wawre in Belgium, ruined by the War, was a typical New School.

The ideal of the New School may be conveyed in a few propositions. Like other ideals, it is not completely fulfilled by any single specimen, or at least by hardly any personally known to me. That is to say, the thirty characteristics enumerated below need not be all presented by a school that can justly claim the title of New School. But with the maximum programme, a minimum programme may reasonably be contrasted. The school must be in

[1] *Cf.* "Projet d'École Nouvelle," *Foyer solidariste*, 1909 (Delachaux and Niestlé, Neuchâtel); "Les Écoles nouvelles," *Éducation*, December 1910; "L'éducation nouvelle théorique et pratique," *Revue psychologique*, June 1910; "Les Écoles nouvelles à la campagne," *Revue illustrée*, September 25, October 10 and 25, 1911; "Coenobiums éducatifs," *Coenobium*, December 1911; "L'éducation nouvelle," *Rapports du Ier Congrès international de pédologie*, Brussels, 1912, vol. ii, p. 470; "Les Principales Écoles nouvelles," *Intermédiaire des éducateurs*, June 1913; etc.

the country; the instruction must be based upon experience and enriched by manual work; there must be self-government by the pupils, to some extent at least; and it must possess not less than half of the thirty characteristics. In this commercial age it is more than ever necessary to beware of counterfeits. Let it be clearly understood that our international bureau of New Schools [1] refuses to recognize as a New School any institution unless, while fulfilling the minimum programme just mentioned, it exhibits at least fifteen of the characters shortly to be enumerated.

I may perhaps be asked upon what warrant I issue a 'decree' concerning the essentials of the typical New School. I need hardly say that I do not issue decrees, but merely record facts. An experience extending over more than fifteen years; frequent and lengthy visits to a number of authentic New Schools; much comparison of facts and of methods; a careful study of results among the pupils at school and after leaving school, in examinations and in everyday life, have served to convince me that certain pedagogic methods applied in certain definite conditions are better than

[1] The Bureau international des Écoles nouvelles, inaugurated in 1899 and organized in 1912, has its headquarters at Les Pléiades sur Blonay, Vaux, Switzerland. It aims at bringing into existence relationships of mutual aid between the various New Schools, at centralizing the literature of the subject, and at the utilization of the psychological experiments made in these laboratories of the education of the future.

others. The modern study of child-psychology has confirmed these empirical results, has connected facts with laws. For, while these laws are based upon experiment, subsequent experiment becomes more precise, more weighty and more irrefutable, when it is guided by sound psychological theory.

Let me add that the following picture of the New School corresponds very closely to the reality concealed by a term which, however unsatisfactory, is consecrated by usage. My aim has been to effect the deliberate illumination of a conception which has hitherto been loosely and incompletely defined.

I

1. The New School is a *laboratory of practical pedagogy.* It seeks to play the part of scout or pioneer on behalf of the State schools, by keeping thoroughly in touch with modern psychology in its methods, and with the modern needs of the spiritual and material life in its aims.

2. The New School is a *boarding-school,* for the full and undiminished influence of the environment in which the child moves and grows can alone render an efficient education possible. This does not mean that the New School considers the boarding-school system to be an ideal for universal application. By no means. The natural influence of the family, if that influence be sound, is invariably preferable to that of the best boarding-school.

3. The New School is in the *country*, the child's natural environment. The influence of nature, the possibility of primitive gambols, gardening and agricultural work in general, constitute the best adjuvant to physical culture and moral education. For the sake of mental and artistic culture, however, it is desirable that a town should be near at hand.

4. The pupils of the New School are grouped in *separate houses*, each group of ten or twelve pupils living under the material and moral guidance of a teacher, assisted by his wife or by a feminine fellow-worker. It is essential that the boys should not be deprived of adult feminine influence, and that they should not be deprived of the family atmosphere, which is unknown in boarding-schools of the barrack type.

5. *Co-education* of the sexes, practised in boarding-schools and down to the close of the period of study, has furnished, in all cases where the material and spiritual conditions have been favourable,[1] moral and intellectual results of incomparable value, in the case of boys and girls alike.

6. The New School arranges that all the pupils shall engage in *manual work* every day, for at least an hour and a half, but more commonly for from

[1] *Cf.* "Coéducation," *Semaine littéraire*, February 20, 1909; "Les Conditions de succès de la coéducation dans les internats," *Communications au Ier Congrès international de pédologie*, Brussels, 1912, vol. i, p. 411; "Coéducation et mariage," *Foi et Vie*, June 1 and 15, 1914.

two to four hours. This is part of the regular curriculum, and is pursued with a general educational aim [1] and on account of its value to the individual or to the collectivity; not with any eye to the pupil's future profession.

7. Among the various kinds of manual work, the leading place is taken by *carpentry*, which develops manual skill and precision, a keen sense of observation, accuracy, and self-control. *Tilling of the soil* and the *rearing of small animals* take their place among the activities common to the history of the race in which every child delights and which every child should have the chance of practising.

8. Side by side with the work definitely specified in the curriculum, a space is left for *free occupations* which cultivate the pupils' tastes and stimulate their ingenuity and their inventive faculties.

9. Physical culture is ensured by *natural gymnastics* [2] performed in a state of nudity, or at least with the body nude to the waist; also by games and sports.

10. *Excursions*, on foot or on bicycles, *camping out* in tents, meals prepared by the pupils themselves; these play an important part in the New School. Excursions are arranged in advance,

[1] *Cf.* "La Valeur morale des travaux manuels," *Rapport du IIme Congrès international d'éducation morale*, The Hague, 1912, vol. i, p. 488.

[2] *Cf.*, for example, Georges Hébert, *L'Éducation physique ou l'entraînement complet par la méthode naturelle* (Vuibert, Paris, 1913).

and serve as adjuvants to the ordinary course of instruction.

II

11. In respect of mental education it is the aim of the New School to enlarge the mind by the *general cultivation* of the judgment, rather than to secure an accumulation of knowledge acquired by rote. The critical faculties originate in the application of the scientific method; observation, the formulation of a hypothesis, verification, the establishment of a law. With a nucleus of regular studies an integral education is secured, not by attempting to provide encyclopædic instruction, but by furnishing an environment and providing books which shall encourage the development of the pupil's innate intellectual powers.

12. General cultivation is reinforced by *specialized training*. At the outset this specialization is spontaneous, taking the form of a cultivation of the preponderant tastes of each pupil[1]; subsequently it is systematized for the development of the interests and powers of the adolescent with a view to his occupation in life.

13. The instruction given is based upon *fact* and upon *experiment*. Knowledge is acquired through personal observation (visits paid to factories, manual work, etc.); or, in default of this, by the

[1] *Cf.* "La Loi biogénétique et l'éducation, *Archives de psychologie*, March 1910.

observations of others recorded in books. Instruction in theory must always follow instruction in practice.

14. Education is thus based on the pupil's *personal activity*. This involves that drawing and the most varied kinds of manual work should be closely associated with intellectual studies.[1]

15. Moreover, instruction is based upon the child's *spontaneous interests*: four to six is the age of play or of discursive interests; seven to nine is the age of interests attaching to the immediate objects of concrete perception; ten to twelve is the age of specialized concrete interests, or age of monographs; thirteen to fifteen is the age of abstract empirical interests; sixteen to eighteen is the age of abstract complex interests, psychological, social, and philosophical. Incidents at school or elsewhere will give occasion, in the case of pupils of all ages, for casual lessons and discussions, which occupy a conspicuous place in the New School.

16. The pupil's *individual work* consists of the investigation (facts, books, newspapers, etc.) and of the classification (in accordance with a logical scheme suitable to his age) of documents of various kinds; of original work; and of the preparation of lectures to be delivered in class.

17. *Collective work* consists of the exchange, of

[1] Cf. *Biogenetik und Arbeitsschule* (Beyer and Son, Langensalza, 1912); "Les Fondements psychologiques de l'École du Travail," *Revue psychologique*, July 1914.

the logical joint ordering and elaboration, of documents which have been studied individually.

18. At the New School *instruction* in the strict sense of the term is *restricted to the morning hours*, being usually given from 8 A.M. to noon. The evening, for a time varying, according to age, from one to two hours, from about 4.30 to 6 P.M., is the period of preparation. Children under ten are exempt.

19. *On any one day but few branches are studied*, not more than one or two. Variety is not secured by treating many subjects, but by the manner in which subjects are treated, and by having recourse to different modes of activity in rotation.

20. *In any one month or term but few branches are studied.* A system of courses of study, analogous to that by which work is regulated at the universities, renders it possible for each pupil to have his individual time-table.

III

21. Moral education, like intellectual education, must not be effected from without inward, by the imposition of authority, but from within outward, by experience and the gradual exercise of a critical sense of freedom. In conformity with this principle certain New Schools have introduced the system of the *school republic.* The general assembly, consisting of the headmaster, the assistant masters, the pupils, and in some cases also the staff of servants, constitutes the real governing body of the school,

and draws up a code of laws. These laws regulate the work of the community for communal ends. When this system is realizable its educational influence is immense, but it presupposes that the headmaster should exercise a preponderant influence over the natural leaders of the little republic.[1]

22. In default of a thoroughly democratic system most New Schools are governed as constitutional monarchies. The pupils *elect leaders* or prefects whose responsibility is clearly defined.

23. *Social duties* of various kinds enable the principle of mutual aid to be effectively realized. Such services to the community are undertaken by the little citizens in rotation.

24. *Rewards*, or positive sanctions, consist of opportunities furnished to creative minds to increase their creative power. They relate to the free occupations, and thus develop a spirit of initiative.

25. *Punishments*, or negative sanctions, have a direct relation to the fault. That is to say, they aim by appropriate means at enabling the child to attain better in the future the good end which he has failed to attain or has attained but imperfectly.

26. *Emulation* is fostered chiefly by a comparison made by the pupil between the work he is at the time doing and the work that he has done in the past;

[1] *Cf.* "Le Self-Government scolaire, *Communications du Ier Congrès international de pédologie*, Brussels, 1912, vol. i, p. 408; also the articles previously quoted. *Cf.*, in addition, William R. George, *The Junior Republic* (Appleton, New York, 1912).

it does not depend exclusively upon a comparison between his own work and that of his comrades.

27. As Ellen Key has written, the New School must be an *environment charged with beauty.* Its first condition, its point of departure, must be order. The industrial art which the individual practises and which permeates his life leads up to pure art, fitted to awaken, in artistic natures, the noblest sentiments.

28. *Concerted music,* choral and instrumental, exercises the deepest and most purifying influence upon those who love and practise it. All the pupils should share in the emotions thus aroused.

29. The *education of the moral conscience* takes the form, as far as children are concerned, chiefly of telling or reading to them stories which will arouse spontaneous reactions in their minds, genuine valuations which, through repetition and accentuation, become in the end guiding principles of conduct. Of such a character is the 'evening reading' in the majority of New Schools.

30. The *education of the practical reason* consists, for the most part, as far as adolescents are concerned, of reflections and studies bearing on the natural laws of spiritual, individual, and social progress. The religious attitude in New Schools is commonly independent of definite creeds. The school will inculcate tolerance for diverse ideals in so far as these represent an effort toward the spiritual advancement of mankind.

These thirty characteristics, drawn from the actual experience of New Schools, render it possible to 'gauge' such schools, if I may be permitted the expression. A single visit will enable a father to decide whether a school to which he thinks of sending his child is or is not a New School. The method is doubtless a trifle arbitrary, but the same may be said of every practical application of a theory. The less arbitrary the procedure by which such a norm of values is secured, the greater its worth, and I have done my utmost to avoid being arbitrary.

Indeed, in a different domain, is not this the method employed to estimate the type of motors which may take part in a speed test or a reliability test? If it be applied to machinery, why should it not be utilized in psychology and education? The rigour of the method may perhaps be modified by recording that one or more of the specified conditions are realized only to the extent of a half or a quarter. I will give some examples. Let us take six well-known New Schools, and list after the name of each the figures corresponding to the enumerated characteristics possessed by the particular school. Where a number is enclosed in parenthesis this indicates that the particular condition is but half fulfilled.

ABBOTSHOLME (England). 1, 2, 3, 6, 7, 9, 10, 11, (12), 13, 14, 15, (16), 17, 18, 22, 23, (24), 25, 26, 27, 28, 29, 30. Total, 22½.

BEDALES (England). 1, 2, 3, (4), 5, 6, 7, 8, 9, 10,

11, 12, 13, (14), (15), (16), 17, 18, 22, 23, 24, 25, 26, 27, 28, 29, 30. Total, 25.

ROCHES (France). 1, 2, 3, (4), 6, (7), (8), (9), (10), 11, (13), (18), 22, 23, 24, 25, 26, 27, 28, 29, 30. Total, 17½.

LIETZ (Germany). 1, 2, 3, 4, 6, 7, (8), 9, 10, 11, (12), 13, 17, 18, 22, 23, 24, 25, 26, 27, 28, 29, 30. Total, 22.

ODENWALD (Germany). From 1 to 30. Total, 30.

BIERGES (Belgium). All the points except (4) and 5. (Faria is entirely in favour of education of the family type in which the pupils are housed in little groups. But the abundance of pupils and the impossibility of improvizing new buildings during the school year compelled him to lodge his twenty-five pupils in a single house. As far as co-education is concerned, Belgian conditions of political and religious life made it impossible for Faria to adopt this reform, though it is one which has his full sympathy.) Total, 28½.

This Introduction has been long enough. The reader will doubtless be eager to make personal acquaintance with the remarkable school at Bierges-lez-Wawre. I therefore call upon Faria de Vasconcellos. A man of Portuguese birth, but Belgian by education (he is doctor of laws and social science), Belgian in his professorial career (for ten years he was professor of psychology and pedagogy at the

New University of Brussels) and married to a Belgian, he is before all a humanist in the widest sense. Although he was exiled by the inexorable necessities of the War, he has not abandoned the hope of resuming his educational labours in a Belgium restored to her native genius. We extend our most cordial sympathy to this pioneer in the education of the future.

ADOLPHE FERRIÈRE

The substance of this volume comprises three lectures delivered at the Institut Jean-Jacques Rousseau of Geneva in the months of February and March 1915. The familiar style of the lecture has been retained.

A NEW SCHOOL IN BELGIUM

CHAPTER I

ENVIRONMENT—PHYSICAL EDUCATION

Foundation of the School—Site—Buildings—Bodily Hygiene—Physical Education—Craft Training—Agricultural Work.

I MUST begin by thanking the Institut Jean-Jacques Rousseau for its hospitality. In existing circumstances my reception here moves me profoundly. Although the tragedy has now been in progress for six months, I find it difficult to realize that I am among you far from my school, far from Belgium. For those whose work in Belgium was the education of youth, the blow when it fell was the more terrible because they had confided all their hopes to treaties, to the peaceful settlement of international problems. Love of peace, respect for agreements they firmly believed to be inviolable, had been honestly made by them the foundation of patriotic education. They taught children to love their country, simply, but not forgetting to explain that we all share a common country. It is vaster, its boundaries are more extensive, we said, but how alive it is, this country

of humanity, the country of all efforts accomplished by all nations, each acting in accordance with its own nature, in the liberating advance toward more brotherliness, goodness, and justice! We explained that man was no longer, as he had been in former days, a wolf toward other men. Enriched by the achievements of progress, by increasing possibilities of beauty and goodness, man was now able to look toward higher things, able to devote himself to cultivating the supreme values of the spirit. Recent events seem to have given us the lie, and that is why I am among you to-day. But our faith remains unshaken, for above men and above nations the spirit of humanity endures. Despite all horrors and all atrocities, the ever-burning torch which illumines the route as we climb toward the peaks will not be extinguished. If everything had to be done over again, Belgium would make the same choice, just as the teachers of Belgium would say once again to their pupils: "Fear nothing in the hour of danger; retain your faith in man, in his essential honesty, in his increasing goodness." It is this simple faith in what is good in man which has made the Belgian action so truly and nobly human. It has shown that efforts toward the redemption of mankind are not lost; it has exemplified a concentration of the energies of that morality toward which man has aspired since man first began to exist. It has safeguarded and preserved the common heritage of the moral life. The

pacific education of Belgian youths has not, as you can see for yourselves, dulled their combative energies. On the contrary, that education, glorifying and magnifying the humanity that is in man, has rendered it possible for us to stand erect in face of the resurrection of ancestral brutalities which has resulted from the militarist education on the other side of the frontier.

I. Foundation of the School

Let me now turn to the main subject of these lectures, a New School in Belgium.

I should have preferred that you should have had the opportunity to see it close at hand, for you can judge a school better when it is actually at work. But to make my exposition as vivid as possible, I shall frequently quote from the school magazine, which was entirely edited by the pupils. Therein they speak of what they do, discuss the methods of instruction, relate the principal incidents of the term, describing the excursions, the most notable experiments, the debates, etc. This will give you an idea of the school activities, and to a considerable extent it will be from the pupils themselves that you will learn how we do things.

The school was founded in October 1912, and was looking forward hopefully and vigorously toward its third year. It was the first New School in rural surroundings to be inaugurated in Belgium. Unquestionably it fulfilled a need, for from the first it

inspired a benevolent interest which was most favourable to the progress of the undertaking. Consequently, having started with nine pupils, in a year and a half we had no less than twenty-five. While awaiting the construction of suitable buildings, I found it necessary to enlarge the old ones to enable me in 1914 to receive new pupils whose names had been entered as far back as the Easter holidays of the previous year.

It was with some apprehension that I made up my mind to found a New School. In Belgium, owing to the intensity of religious and political struggles, educational problems are debated with lamentable acerbity. The attempt to carry my scheme into execution, to found a school which should be above the struggles of party, might have seemed Utopian, especially if the attempt should be made to provide an education with a broadly humanistic basis, one utterly hostile to exclusivism, to absolutism of any kind.

It was our hope that we should be able to realize in its completeness the formula, the school for the child.

To manifest our idealism amid the forces of a crescent utilitarianism, and to show that the essential aim of the school was to provide education in the most comprehensive sense of that term, we secured a committee of patrons composed of persons whose life and work might serve as guarantees of our aims. The following kindly agreed to serve

on this committee: Alves da Veiga, Portuguese Minister in Brussels; G. Compayré; Dr Decroly; G. De Greef; Devogel; Adolphe Ferrière; T. Jonckheere; J. Holdsworth; M. Maeterlinck; A. Nyns; de Oliveira Lima, Brazilian Minister in Belgium; N. Smelten; Dr P. Sollier; Dr Schuyten; E. Verhaeren.

The appointment of the teaching staff, often a delicate and difficult matter, was made under the most fortunate conditions. I was able to assemble a group of men, of friends, whose skill, devotion, and knowledge of the child mind enabled me to realize the school programme. The teaching faculty at Bierges numbered seventeen persons, including the two master craftsmen, a smith and a carpenter. I shall return to this question later.

II. Site

Choice of site is of capital importance to a school. Gabriel Compayré, in a book he has been good enough to devote to my experiment, is right in declaring that the primary factor of success for a New School is the choice of a suitable locality. I have no reason to regret our selection. We are in Brabant, in the open country. The valley of the Dyle, upon which we look down, and the wooded hills in the neighbourhood, constitute a picturesquely beautiful setting. We cannot boast the magnificent scenery of Switzerland, the land in

which so many Belgians are recruiting their strength and reviving their hopes after a time of hardship. But at Bierges the situation is so calm, so restful, and so pleasant that everything about the place inspires ease of mind, good temper, peaceful labour, and the joy of life. These things exercise a precious influence upon the child, favourably affecting its physical and its moral development. The very fact that life is happy leads the mind to strike deep roots into this peace, whence it draws a nutritive sap.

It is farming country, so that the pupils can observe close at hand the agricultural applications of science. We are surrounded by large and interesting farms. Not far away is Gembloux, with its agricultural training college, justly regarded as one of the best in Europe. But at no great distance are some of the busiest industrial centres of the land, and this enables us to pay frequent and regular visits to factories and mines, to acquire a knowledge of that vast domain of work and workers which Constantin Meunier, the great Belgian sculptor, has so puissantly exemplified in the marble epic of toil, of the heroism of sacrifice, of patient and fruitful production. In my next lecture I shall give you an account of these excursions and of the manner in which they are prepared and organized by the pupils.

Finally, since we are close to Brussels, which can be reached in three-quarters of an hour by train, the school can make the most of the advantages offered by a large town. We can pay regular visits to

museums and to the leading exhibitions of sculpture and painting; we can follow artistic developments, attend concerts, and witness plays of educational interest, especially at the literary *matinées* devoted to French classical plays and to the work of notable foreign playwrights; these plays constitute a practical course of literature and render the pupils' ideas on such subjects clearer and more concrete. Occasionally we even take some of the seniors to the university to attend such lectures as are fitted to clarify and amplify the school studies. For example, on Saturdays at five o'clock there was delivered at the New University of Brussels a course of lectures on the art of the Far East. A number of our pupils attended these lectures, as our own studies in geography and history were at this time specially directed to the countries concerned.

These particulars will show you that the situation of a school is of outstanding importance. A country life need not mean isolation, a Tolstoyan renouncement of the enormous educational advantages offered by the large town. I want to emphasize this point, for I have met a great many people by whom this return to nature that underlies the New School movement is valued as a mystical, exclusive, and absolute symbol. They regard it as a kind of enfranchisement from the diabolism of the ever-spreading town. While it is excellent to bring up children in the country, it would be a matter for genuine regret if young people were to be deprived

of certain beneficent influences associated with town life. I think it would be a serious mistake to settle too far from a great centre, for the school cannot be entirely self-sufficient, especially where pupils of fourteen, fifteen, and upward are concerned.

Besides, an advantage which must be taken into account is the possibility of arranging for frequent visits from professors and lecturers, whereby the intellectual activity of the school may be enriched.

Establish your New School in the country, but not far from a large town. This I believe to be the best plan.

III. Buildings

Bierges School consists of a dwelling-house, two separate buildings for class-rooms, the farm, and various annexes. Surrounding these are kitchen-garden, orchard, and arable land—grounds which extend to about fourteen acres, and are amply sufficient for our needs.

The dwelling-house contains the bedrooms, the bath-room, the cloak-rooms, the dining-rooms, and the drawing-room. It is a home, a place for family life, calm and restful, without the continual coming and going attendant on school life when the class-rooms are under the same roof as the living-rooms.

I regard this separation as absolutely essential, not only from the point of view of the division of labour, which is thus effectively realized, but also

because by this arrangement the idea of the home stands out better in the midst of the totality. Where the school is very small we may dispense with such absolute separation, but in my opinion it becomes extremely desirable as soon as the number of the pupils reaches and exceeds thirty. The advantages are numerous. We gain in orderliness, cleanliness, space, freedom of movement, happiness. Since social life never fails to involve trifling conflicts, minor troubles, resulting from the inevitable frictions of the environment, a child is glad to secure wholesome relaxation in the beneficent tranquillity of the home.

Of the two class buildings, one is especially reserved for the workshops, the studios, and the laboratories. There is a smithy and a carpenter's shop; there is a physical and chemical laboratory; there are shops for bookbinding and cardboard work; and there are studios for modelling and drawing. In this case also it is advantageous to separate the fields of work. If we leave our pupils the right to study as they please, we must take precautions that they do not interfere with one another's work. If, as at Bierges, the workshops and studios are isolated and remote from the ordinary classrooms, those engaged in the former can pursue their activities without disturbing the studies of those engaged in occupations for which silence, calm, and continued attention are indispensable—attention which might be rendered difficult amid

the noise apt to be made by children employed in manual labour.

The second class building is at the farther end of our demesne, several minutes' walk from the dwelling-house. It comprises four class-rooms, an art room, and a natural science laboratory (microscopy, dissection, collections, aquariums, and terrariums).

Around the buildings are the garden, the wood, and the land under cultivation.

Our pupils thus live in thoroughly wholesome surroundings. Fresh air, space, freedom, and light are unquestionably the best environing conditions to induce a natural and effortless progress in vigour and health. But the salutary influence of country life is supplemented by carefully planned physical training.

IV. Bodily Hygiene

The first requisite of physical culture, the first thing the body needs for the promotion of beauty and of strength, is a sound regulation of life.

(*a*) Let us take sleep first. The children sleep for from nine to eleven hours daily, the time varying with age and season. The bedrooms are spacious. The pupils sleep with their windows open in any weather and throughout the year. No risk is involved, for we have a system of central heating, and the radiators keep the rooms warm and dry.

Moreover, the children are so thoroughly inured

to cold that last winter several of them slept in tents during nights when there was a sharp frost. For persons who have been gradually hardened to the practice, no delights can exceed those of passing a night under canvas, with its suggestion of romance and adventure.

We have four or five beds to a room, and in each room there are seniors and juniors, for this renders the environment richer in valuable social reactions. The walls are adorned with drawings made or engravings selected by the inmates.

During summer a siesta is always taken after dinner. When active growth and ossification are in progress it is extremely desirable that the child should have a period of recumbency during the day. The practice is favourable to an erect carriage.

(*b*) There are five meals daily, for in addition to the customary meals there is a very light lunch at ten o'clock. At supper no meat is served; only eggs, milk food, farinacea, or vegetable dishes. We take no alcohol in any form.

Most of our food is derived from our own grounds, and is the produce of the pupils' work. They till the soil and manure it, they sow, and they reap the harvest. Our live stock is tended and bred by them. It consists of cows, fowls, rabbits, pigeons, pigs, etc. A co-operative society has been founded by the pupils, a society which is seriously engaged, upon business lines, in exploiting the school grounds. From this society we buy our butter, milk, and eggs.

Instead of one great dining-room, we have two or three smaller ones. This makes our meals more homelike. With the same end in view, we have small tables, each seating from six to eight pupils.

Conversation goes on freely during meals, and the children help themselves. This freedom is essential, for thus only can they learn how to use it rightly, thus only can they acquire agreeable table manners. Moreover, the practice lends gaiety to these periods passed together and induces a mood of relaxation favourable to digestion.

(*c*) Except in cases where medical advice to the contrary is given, the pupils have a cold spray every morning throughout the year. As soon as the season is sufficiently advanced great benefit is derived from swimming in the school pond. This most salutary exercise is taken in the afternoon; and after leaving the water the pupils, entirely nude, enjoy a sun-bath in the neighbouring meadow.

There are frequent ablutions during the day; and in the evening, on going to bed, a more elaborate toilet is performed: the face, the hands, and the feet are washed, and the teeth are brushed. This practice establishes cleanly and hygienic habits.

(*d*) Last of all come concrete and practical lessons concerning physical culture, the hygiene of the sense organs, the hygiene of the dwelling-house,

etc. These lessons, given weekly by our physician, furnish the pupils with a better understanding of the principles that underlie a healthy and vigorous life, and teach them how to apply these principles. I may mention in passing that among the scholars one always holds the post of 'doctor.' This office serves not merely to develop sentiments of initiative, brotherliness, and responsibility, but also gives opportunities for putting into practice the knowledge acquired in the hygiene class. The first-aid officer, appointed for a month by his comrades, has to deal with all the injuries and illnesses which may arise; he presides over the school pharmacy; and he is responsible for the execution of various hygienic measures. It is obvious that the fulfilment of this function, while necessitating the capacity to recognize the nature of the various pathological cases, necessitates in addition a knowledge of how they are to be dealt with, what medicaments to use, what dressings to apply, and so on.

I need hardly say that our physician and our gymnastic teacher (who is also a medical man) closely observe and control each pupil's physical development. A record is kept for every pupil, showing his weight, stature, the circumference and diameter of his chest, his muscular power, the state of his sense organs, etc. The details in every case are regularly communicated to the parents.

V. Physical Education

Frequent meals, an ample allowance of sleep, baths, fresh air, space, light, cleanliness, hygiene—these things are favourable to the very active life led by our pupils, and enable physical training to yield its best fruits. To the influences just enumerated, all contributory toward energy and vigour, we add games, sports, physical culture, walks, excursions short and long, agricultural work, and the practice of different crafts. The more varied the exercises, the more efficient will be the bodily culture. Each of the practices named awakens and develops corporal aptitudes and energies and moral and intellectual capacities differing in every case, but all co-operating toward the same end, which is to make of the child an integral human being. Let us review the various methods.

(*a*) In the first place we have games and sports. Games are necessary. The child desires to play and must be given opportunity to play. A longing for games is an unmistakable sign of physical and moral health. Games constitute an important part of the programme. They stimulate the intellectual life and provide opportunities for fruitful experience. They prepare the child for the subsequent stages of existence, teach him how to utilize his forces to the best advantage, accustom him to know himself while bringing him into contact with the surrounding world. They give pleasure, and simul-

taneously they develop skill, versatility, and courage. Apart from free play, which the pupils engage in as their fancy prompts them, we attach great importance to more formal collective games, such as tennis and football, which favour the acquirement of sentiments of mutual aid, solidarity, and discipline, habituating the participants to strive on behalf of a common cause, the cause of their own side, and to submit to a law, the rules of the game.

The juniors play games suited to their age—prisoner's base, hide-and-seek, and many others which their fertile imaginations suggest. Also certain games of skill, such as catch-ball, are useful. They run races, etc.

The seniors and those of intermediate age play hockey, football, tennis, basket-ball, etc. In winter we play the brisker and more energetic games, while the summer games are naturally less vigorous, tennis being especially suitable for the hot season.

Every week the elder pupils elect an umpire for the games of the younger ones and also one for their own games. The umpire, deciding any disputes that may arise, develops his own sentiment of justice, and acquires the self-command and tact which are essential to all who take part in social life.

It need hardly be said that, in conformity with the need for social life which characterizes all children after the age of puberty, the elder pupils have organized games clubs and have drawn up

codes of rules. Here are some of the rules of the tennis club:

(1) The members of the tennis club play on a piece of ground hired for the purpose, with the club balls and net.
(2) There is an entrance fee of 50 centimes and the subscription is 50 centimes per month.
(3) No one can become a member unless he has a racket of his own.
(4) Club meetings are held once or twice a week.

Every afternoon, after the siesta, there is a period devoted to games and sports.

On Tuesday and Friday afternoons the boys also practise various arts of self-defence, such as fencing, boxing, French boxing (*savate*), wrestling, running, leaping, under the direction of the gymnastic teacher. These sports develop suppleness, courage, coolness, and strength. Only the seniors engage in them.

In addition to games and sports our young people also practise the exercises and games of the Boy Scouts, in which they take part during their walks and excursions. Since we have a complete camping outfit, including three large tents, cooking utensils, etc., we are able to enjoy all the delights, the surprises, and the extemporizations proper to an independent open-air life. Our pupils, besides having a camping club of their own, are attached to the Belgian Camping Club.

If due allowance be made for all our methods of instruction, for their practical applications in the acquirement of knowledge, for the qualities of initiative, perspicacity, and individual enterprise requisite to their utilization; if, further, there be recognized the trouble we take that our pupils shall have as full a life as possible, one with adequate responsibilities, one that is generous, loyal, and humane, one that has unmistakably produced satisfactory results; if, finally, there be considered the part played in our curriculum by games, sports, and crafts, and the importance allotted to these—it may be asserted without hesitation that our influence is yet more extensive and more profound than that of the system which Baden-Powell has so ably inaugurated for the Boy Scouts. One of the Belgian Chief Scouts, who visited the school to invite us to join the Belgian association of Boy Scouts, readily admitted this, saying, after he had studied the organization and the working of our school life: "You practise the most thoroughgoing Scoutism." Indeed, the school is the permanent and continuous organization of a life in conformity with the Scout's ideal. But it has not adopted the Scout uniform. It has, moreover, withstood tendencies, fortunately few in number, which now and again incline to exploit the Scout movement for certain specific ends, such as militarism, nationalism, or perhaps some form of political or religious exclusivism.

(*b*) Instruction in physical culture is given twice weekly by a young medical man, who is an enthusiast in the matter. His suppleness, his strength, his staying power, and the symmetry of his body constitute a living illustration of his system, which is based upon those of Ling, Muller, and Hébert. The aim of this system, to speak only of its physical aspect, is to develop muscles and groups of muscles by appropriate exercises.

Besides collective exercises, among which respiratory exercises take the first place, as they are suitable for all pupils alike, there are individual exercises with a definite therapeutic aim, specially considered in relation to each pupil, taking his age, his constitution, and his particular development into account. The results in some cases have been astonishing. One lad of sixteen had when he first came to us so marked a lateral curvature of the spine that the surgeon consulted in Brussels had prescribed for him an orthopædic jacket, a regular cuirass imprisoning the body in a sheath of iron and steel. A few months later, without the use of any apparatus whatever, by the natural effort of the muscles called into play by special exercises, his spine had been almost completely straightened.

These lessons are given in the open air, and preferably with the pupils stripped to the waist. Under such conditions, the exercises furnish magnificent results.

But set exercises do not constitute the totality of

physical education; they are no more than means to an end. For children they may even become an abstraction difficult to understand, a wearisome task whose purpose remains elusive. I will go farther and say that to make children do gymnastic exercises for the sake of gymnastic exercises seems to me as undesirable as to make them read or calculate for reading's or calculation's sake. When reduced to a routine, physical culture is of necessity arbitrary, artificial, unintelligible, unacceptable, and unduly abstract. It produces weariness and boredom, and profits little. Besides, there are numerous bodily occupations providing natural, practical, and lively movements, which interest the child because they give spontaneous expression to his activities. Such possibilities are offered by games, running, leaping, climbing trees, gardening, swimming, carpentry, work in the blacksmith's shop, etc. Activities which express the spontaneous needs of the child's natural life are much to be preferred to those which the best systems of physical culture can offer to children under fourteen or fifteen years of age. It is not until this age is reached that physical culture, regarded as a complex of systematized movements, can become of genuine interest from the educational point of view, being now of value not merely in relation to the development of the body, but in relation also to the development of the mind. To our senior pupils, therefore, we expound the theory of physical

culture, so that they may grasp the purpose of each movement.

As for the juniors, they run and jump as they please, climb, swim, and garden. Their part in formal physical culture lasts but a few minutes, during which they are taught a portion of the simpler exercises.

(*c*) We have frequent and numerous walks and excursions. We visit factories, museums, scenes of natural beauty, historic monuments. We make our way about sometimes on foot, sometimes on bicycles, sometimes by train, and we go out in all weathers. Twice every week, and especially in winter, when there is little to do in the fields, we make it a rule to give the whole afternoon to an outing. In addition, once a fortnight an entire day is devoted to an excursion. During the spring and summer term all the pupils except the little ones start on Saturday afternoon with their tents, and, walking or bicycling, make their way to some interesting spot and encamp there. On Sunday, accompanied by the younger pupils, we go by train to join them, overrun the district, and return to school in the evening.

Every other month we undertake a big excursion lasting five days, the purpose being to carry out studies bearing on the class work. In this way we have been all over Belgium.

At the close of the school year, when class work is finished, we spend from two to three weeks in a still

more ambitious journey. In 1914 we went to the Belgian coast, and thence actually got across to Dover. A year earlier we were allured by the Grand Duchy of Luxemburg, and went up and down the duchy camping out, cooking our own food, in the woods, beside the streams, in the wide expanse of nature, taking everything as it came, enjoying alike the pleasures of the real and the poetic delights of the imagination, vagabonds in pursuit of the ideal. How full of instruction and how full of emotion are these excursions! Solidarity, mutual aid, initiative, practicality, patience, endurance, vigour, gaiety, good temper, art and science—one practises or experiences them all. Such a life awakens, fosters, and increases all the virtues of man.

Yet vaster projects loomed in the distance. First of all we thought of studying the industrial regions of Germany, England, Belgium, and France, for a comparative examination of these would have been of the utmost value to our pupils. Next were to come long journeys in the East during the summer holidays, visits to Morocco, Algeria, Tunis, Egypt, or Palestine, returning by way of Turkey, Greece, or Italy, to direct the boys' interest toward the fascinating relics of ancient civilizations. Different as were classical customs from ours, different as was classical art, history, and poetry, nevertheless all that has passed away can be recalled to life in most impressive fashion when we revisit the very places where our spiritual ancestors have lived,

suffered, and sung. For those who know how to travel economically, for those who are able to camp out (the reader will remember that we have a complete outfit), these extremely instructive wanderings are by no means expensive.

VI. Craft Training

To conclude the account of bodily exercises and occupations, it remains to deal with craft training and agricultural work.

In the school prospectus I explain in the following terms the function and purpose of craft training:

"Such crafts as those of the basket-maker, the potter, the cardboard worker, the modeller, the bookbinder, the carpenter and joiner, and the smith complete our physical exercises, and constitute a valuable factor in the child's physical and mental development. Besides satisfying that need for activity which is so imperious in the young, they develop the faculties of observation, comparison, and imagination; they stimulate the spirit of initiative and the constructive faculties; they constitute a training in accuracy; they furnish numerous opportunities for applying all kinds of knowledge (natural science, arithmetic, physical geography), giving such knowledge a concrete and vivid expression. Moreover, the pupils thus gain the manual dexterity which is so essential in later life."

So much for theory. Let us now turn to the practical organization of craft training.

(*a*) As the above enumeration will have shown, we give craft training of various kinds. The aim is to provide the child with manifold opportunities for activity, creation, the application of ideas, self-revelation. For, while all varieties of manual work appeal to similar activities, they exhibit specific distinctions in respect of the influences they exercise, the actions they induce, the tendencies they awaken, and the faculties they encourage. The more diversified the craft training, the better chance will there be of satisfying the pupil's need for manual occupation, and of discovering his tastes, his tendencies, and his peculiar aptitudes. Thus knowing him better, we shall be able to guide him more successfully.

A typical instance is that of one of the boys who, destined when he came to us for a commercial career, showed in our carpenter's shop and smithy that he possessed manual dexterity and associated intellectual skill of a character which served to convince him that he was on the wrong road. For this reason he decided to become a mechanical engineer, a career far more suitable to him. The case is by no means unique.

(*b*) The craft training is adapted to the pupil's age. The youngest of our scholars, ranging from eight to ten years, are taught to make articles of folded paper and of cardboard, and to practise modelling and drawing. As regards outdoor work, they keep the garden paths in order, cultivate their

own plots, and tend the smaller live stock, such as fowls, rabbits, and pigeons. They have been able to make some comparatively ambitious structures, and notably a rabbit-hutch. Let one of the older pupils tell the story:

In November the juniors reported the construction of a huge building in which to keep the rabbits. They laid the foundations, mixed the mortar, did all the work themselves. The walls are not very thick, but they are five feet high. The hutch is five feet wide. It is roofed with tarred felt.

Aided by the seniors, the juniors made the window and the door in the carpenter's shop. It was a long job, but at the end of a month the rabbits were installed. How delightful to do some brick-laying, to make mortar out of lime mixed with water and sand, these two friends to the child and valuable aids to the master! How delightful to see the finished structure, to be able to show it off to schoolfellows and to relatives! Yet how sad that the work should come to an end, even though there have been differences of opinion and little troubles to overcome! The architects would really like nothing better than to demolish the whole thing so that they might begin all over again. But let anyone beware who, not belonging to the group of builders, should venture on a word of criticism, or suggest the destruction of this idol, for then the builders, immediately on the defensive, would think of nothing but protecting their work. A

child is full of these contradictions, wherein shines the spark which illuminates his individuality.

From the age of ten upward, the pupils work also in the carpenter's shop, and when still older in the smithy. This last is reserved for lads of larger growth, for forging requires a good deal of muscular strength.

(*c*) Most of our craft training is given in the afternoon, but in some instances in the morning as well. In any case, a pupil can find time during the forenoon to devote to manual work, and to engage in the workshop or studio in occupations, it may be of individual advantage, it may be for the general good, or it may be as a practical application of one of the branches of theoretical instruction. I wish to emphasize that it is undesirable to arrange that manual work shall be done exclusively in the afternoon. Physical and mental labour should be alternated, and this in the interest not merely of general education, but also of specific instruction. Many people find it difficult to understand that manual work is a means for the expression of the needs, sentiments, and ideas that result from the acquisition of knowledge by the pupils, and that cardboard work, modelling, drawing, and carpentry are just as important as reading, writing, and arithmetic. Let me add that precisely because we avoid looking upon these things as ends in themselves, because we do not work in cardboard simply in order to work in cardboard, because we do not

model or draw for modelling's or drawing's sake, any more than we read for the sake of reading or dictate for the sake of dictation—precisely because all these occupations are correlated with the pupil's different mental and social activities is their educational worth so considerable.

(*d*) The studios and workshops are thoroughly well equipped. When a pupil enters the carpenter's shop or the smithy and sees the fine assortment of tools ready for use there, he immediately derives the impression that this is a place for serious and important endeavour. He feels that if it is possible to make a simple punt for use on the pond, it is also possible to make a door, a window, and the like. To have available a variety of tools and instruments, and these of the best, exerts, especially in the case of the elder pupils, a salutary influence, strengthening their powers of will and invigorating their critical faculties. In physical experiments I have seen some of them inclined to doubt a scientific principle because the more or less rudimentary instrument utilized in the demonstration failed to give absolutely accurate results. Young people are not content with approximations; they like data to be mathematically exact; and their restless minds, seeking, questioning, and doubting, have a thirst for absolute precisions, for definite certitudes —at the very time when, by a striking paradox, they have a taste for dreams, and for the winged flights of fancy and imagination.

(*e*) Each workshop or studio is under the special charge of one of the pupils, these responsibilities being allotted each term by the assembly of pupils. The curator arranges the rotation of the classes; by his instrumentality requests or complaints are transmitted from the pupils and the teachers to the governing body of the school; he must ensure that the place is kept in order, and that tools, instruments, and books are restored to their places after use. He keeps an inventory and sees that the tools are in good condition; he is the person to apply to about all work to be done in his department, whether this work be individual or social; finally, he has to buy materials and tools as needed, making terms, either personally or by letter, with those who supply them, and every day he must post a record of correspondence, bargains, and expenditure. Whether we are concerned with the smithy, the physical and chemical laboratory, or the carpenter's shop, this duty is one of great educational value. The curator learns a number of things that are extremely important. Simultaneously his character and his intelligence are formed, tempered, and solidified. He is trained to play his part in life's combat; for, while he has great freedom of action, he incurs also considerable responsibility. His freedom of action, I repeat, is extensive, for the young man is master in his own house; he organizes the working gangs and the work itself; he has to receive any complaints that

may arise, and usually knows how to meet them; he governs his own sphere of work, keeps it going, and encourages its development. As for his responsibility, this also is by no means trifling, for it involves the effective supervision of order, tools, materials, produce, and of the money required for the purchases—a couple of pounds each month.

I have frequently been asked if I was not afraid that the pupil would make a bad use of these extensive freedoms. I have no reason to do anything but congratulate myself upon the results. Difficulties doubtless arise, but it is good for young people to learn how to cope with difficulties. It is good for children to be free to act, for I do not see how an effort can be truly educational from the moral point of view unless it be the outcome of reflection and decision based upon personal experience. If the child begin by doing badly, he will force himself to do better. We must therefore allow him to live morally; we must permit him, that is to say, to excel himself, to get beyond evil in order to reach good. All this must be done discreetly and without any fuss. We must give the pupil opportunities for action, we must multiply his possibilities for experience, since these alone can endow him with character. If he has done ill, point it out tactfully and relevantly. Every young man of good instincts will at once endeavour to do better.

Further, a young man accustomed to action,

accustomed to do things for himself, besides enriching his mind with all the observations and comparisons derivable from any experience, will also acquire the habit of asking advice, of reading up his subject, of collecting the data which may enable him to form a judgment and to translate that judgment into action. This is what our young people always did at Bierges. Before they came to any decision, they discussed everything among themselves, and they asked the advice of every one they could get hold of. The organization of the farm, a matter shortly to be described, is a striking example of what I have just been saying.

(*f*) In what manner, at school, do we undertake and complete some piece of manual work? I shall make you understand this better by taking a concrete instance and exhibiting the different stages. I choose the construction of a great terrarium made for the natural science laboratory. It will be seen that we were fulfilling a social need, and that the work of construction had an educational application while simultaneously subserving the collective advantage.

Such enterprises may originate in the mind of a single pupil, or in the decision of one of the classes which has instructed a pupil or pupils to such an end. In the case of the terrarium, the notion was that of the zoology class.

One of the lads, then, is commissioned by his comrades to undertake the provision of a great

terrarium. How is he to set about it? He must not proceed at hazard, without knowing the means available for his purpose. There must be an initial period for research, for the collection of data. A model must be found or made. Knowing what he has to do, the constructor is nevertheless unable to work until he has satisfied the following conditions:

(1) He must make an exact design, drawn to scale in accordance with all the rules of the designer's art.

(2) He must draw up specifications of the quality and the amount of wood and other products to be employed. In the present case these other products are: wire gauze, bolts, nails, and so forth.

(3) Total cost—this involving an estimate of the price of the wood, wire gauze, etc.; an estimate of the number of hours requisite for the work; and an estimate of the sum it would be necessary to pay for labour, if outside labour were employed.

When the specifications and estimates are ready, they are submitted to the approval of the pupil who acts as foreman in the carpenter's shop, and to that of the master carpenter. Examination, criticism, discussion, modification, if necessary correction, follow. Then the design, the specifications, and the estimates may be passed. If they be rejected, a fresh start must be made, with the guidance of the criticisms that have led to the rejection.

When the work has been completed, a further

discussion ensues concerning the technical value of the finished undertaking, a consideration of its merits and its defects.

The same procedure is followed, not only in the case of other woodwork, but also in the case of iron-work, agricultural work, etc.

As regards the cardboard industry, the junior pupils who practise this are taught to draw preliminary designs, to estimate the amount of paper and cardboard they will use and the time that will be needed, and also to estimate the total cost of the article they are going to make.

By manual work in the sense thus defined we initiate our pupils into professional and industrial life, into practical life. The work becomes a potent instrument of intellectual and social education.

A knowledge of tools and raw materials, the drawing up of specifications with estimates of final cost, of the number of hours of work needed, and of what would have to be paid for this work at the ordinary rate of wages, do not merely serve to instruct the pupils in methods of production, and, as I have explained in my prospectus, to bring them into contact with the actualities of human life and work, but likewise enable them to measure the producer's effort and remuneration, and this will tend to open for them wide horizons concerning social problems.

Craft training, as we understand it, thus involves the application of a practical criterion of

incontestable value, and serves as an introduction to the actualities of everyday life. There is nothing academic about it, nothing false or artificial, and, let me repeat, we never do manual work simply for the sake of manual work. We have no conventional or uniform schemes applicable to the entire class, for with us manual work is regarded as a means for the expression of ideas, and for the satisfaction either of individual needs or else of the needs felt by the social environment in which the child develops, lives, and works. To teach the pupil to use his hands, his tools, and his raw materials in order to create useful objects, is to teach him how such objects are made in the wider life that surrounds the school.

In addition, when we teach children to collaborate in a manual undertaking, we are pursuing their social education. Our pupils participate in the scholastic enterprise. Everywhere are visible the traces of their passage, everywhere can be seen the imprints of their eager and active co-operation. Of many things in the school they can say: "That is our work. We made it." It seems to me that an educator can hardly experience a joy more intense than to hear his pupils exclaim: "This is our own school; we created it!" There is no end to the enumeration of the work which the children have done for the school. They have made towel horses and other accessories for the bath-rooms, boot cupboards, greenhouse tables and modelling tables,

blackboard easels, bookcases, sets of drawers, benches, step-ladders, kneading troughs (for we bake at the school), a rabbit hutch, a pigsty, a dog kennel, a dovecot; finally, they built the cow-shed, a big piece of work of which details will be given presently. I must not omit to mention what they do in the fields, the kitchen garden, and the flower garden. I forget the rest—or rather I spare you a further arid enumeration.

But I will not dismiss this subject without telling you that the senior pupils intended to make formal plans for the new school buildings, both the dwelling-house and the class-rooms. Each one of them had his own ideas, and I know that the architect they consulted on several occasions was much impressed by a number of their happy thoughts.

Our manual work is not designed solely to satisfy the social needs of school life, but is directed also toward supplying the child's personal needs, toward contenting his desire to construct, to imagine, and to create, toward gratifying his appetite for fancy and invention. With this end in view, the pupil is able, over and above disposing of his free hours as he pleases, to devote one class of the two craft classes during the week to individually chosen occupations. Thus regarded, and thus realized, manual work has a profoundly educational mission, whose full cycle you will have grasped as soon as I have explained to you the invaluable supplementary function fulfilled by agricultural labour.

VII. Agricultural Work

As I have told you, the school grounds comprise fourteen acres. We have enough land to supply us with numerous food products. Agricultural work, besides being an inexhaustible source of scientific knowledge, a field for practical applications, a means toward the boys' physical development, furnishes one of the most efficient of conceivable agents for social education. This is tantamount to saying that it is an instrument of moral education, for in my view morality and sociality are inseparable. Not only does it facilitate the initiation of the pupil into practical life, but it helps also toward the realization of a well-planned social life.

(*a*) The juniors are chiefly concerned with gardening and with the care of animals. This latter enables them to make interesting observations and comparisons concerning animal life and customs and concerning the services animals render us. A child that has charge of an animal must care for this animal at fixed hours, and this originates and organizes habits which, simple as they are, underlie habits of much greater importance. Setting out from the interest the child feels in the performance of these duties, we educate its faculty of attention and its will-power, and we inculcate that sense of responsibility which is so necessary throughout life.

The junior pupils take care of the chickens, the dogs, the pigeons, the rabbits and the variegated

and numerous inmates of the aquariums and the terrariums. In these there are fishes of all kinds, indigenous and exotic, mice, serpents, lizards, frogs, newts, toads, and hedgehogs, besides aquatic insects, fierce eaters of flesh, abominable vandals, capable of any atrocity. This population so closely akin to the primary and remote forces of the world, this population whose life is brutal and instinctive, is intensely interesting to the child, which delights above all in colour and movement. Week by week the younger pupils hold a meeting to allot the offices in this department, offices which concern not merely the obtaining and preparing of the animals' food, but also the cleansing and tidying of their habitations. All this involves, though inconspicuously, that the children must take much thought.

As regards gardening, the juniors attend to the upkeep of the paths in the garden, the orchard, and the wood; and they till their own special plots, sowing, tending, and harvesting vegetables, and cultivating their small flower gardens. Let me borrow a few lines from the record kept by the juniors, published in the school magazine in the section "Echoes and News":

Our little natural history society has held meetings as regularly as possible. Its chief work last term was to beautify the garden. Each member has his own garden plot, and each produced at the meeting his plans for cultivating it. We discussed these plans and we carried them out.

The plans in question related to the shape of the beds, and the choice and placing of the flowers. Various shapes were adopted, and some of the plots were most successful in respect alike of form and colour. Here is a simple account of his garden given by a child of ten:

My garden is close to the greenhouse. I have sowed nasturtiums and sunflowers, and I have just planted out forget-me-nots, chrysanthemums, and London pride. With its rose-trees, my garden has a triangular shape. Its borders are marked out with large stones. It is very pretty and everything is growing well. But it is very tiresome that people will walk on the grass which I have sowed close to the lilac shrubbery. The lilacs are in flower. They are of three kinds, white and two shades of mauve. I water my flowers every evening.

You may imagine how we turn this gardening work to account for instruction of various kinds, botanical, geological, physical, meteorological, geographical, and geometrical. It is also of great value in the education of taste, in the inculcation of patience, and in that æsthetic initiation which can be made by nature alone, by the simplest, the most beautiful, and the most vivid things in nature—flowers and trees.

Since I have mentioned the natural history society, let me add that we owe to this body an inventory of the school trees, a classification embracing more than sixty different types, with a table

describing budding, flowering, and the fall of the leaf, a table whose importance will be obvious to you. It has given us an admirable understanding of the relationships between plants and their environment, of the influence of light, heat, soil, exposure, etc.

Most of this work was done by the pupils of intermediate age, but the juniors helped.

(*b*) The seniors and the pupils of intermediate age will obviously be able to undertake field work of a more ambitious character, work having an indisputable moral and social bearing. To them are allotted the labour and the delight of the agricultural utilization of the school grounds. They have undertaken this utilization under conditions which deserve detailed description, and I cannot do better than give you the pupils' own words. One of them writes as follows:

THE FARM

Directly the school was opened plans were shaped for establishing a farm. There were lengthy discussions, for we were all interested in the question. We were to have numerous beasts and to tend them ourselves. There were fourteen acres of land to cultivate; we proposed to sell the produce to the best advantage.

In the geometrical drawing class we determined to survey certain parts of the garden where it was proposed to place the farm buildings. We made finished surveys of several regions in the large

garden. But we hesitated for a long time before beginning to build, for a great many reasons, of which the chief alone need be mentioned. First of all the selected sites had been recognized to be unsatisfactory owing to their excessive dampness. Further, they were too far from the school-house, so that in bad weather access would have been difficult.

The discussions were long continued, but at last, in the early days of December, the plan was finally settled, and, having agreed upon a favourable site, we began laying the foundations.

Each pupil had drawn a formal plan, in accordance with all the prescriptions of law and custom. The cow-house was destined to receive two cows only, there being sufficient room for the other animals in the existing annexes.

Though the foundations were fairly deep they were soon dug, for the weather was favourable. We now had to become woodmen, for a large cherry-tree was in the way and must be cut down. For several hours, therefore, we took it in turn to wield the axe. We then began the walls. Under the supervision of our bricklayer, who is the school man-servant, we learned how to use the trowel. There was no lack of craftsmen or of labourers. All put their backs into the work, especially during the free hours.

While building was in progress it was suggested that we should found a company to farm the land and dispose of the produce. The members were to buy shares and the profits were to be distributed proportionally to the number of shares held. The proposal was hailed with acclamation.

It was necessary to decide what type of company

we should form. " This is no difficult matter," said Monsieur Faria. " Go and consult a lawyer. It is his business to advise in such questions, and he will put you on the right road." Realization drew nearer and nearer. After an appointment had been made through the kind instrumentality of a friend, the three eldest among us went to Brussels to consult our lawyer. The consultation lasted an hour, during which we learned how such companies are worked, what are the various kinds, and which kind would be best suited to our purpose.

At a meeting held next day we reported the results of our mission, and unanimously agreed to found a co-operative society. Monsieur Faria, all the seniors, and some of the juniors are members.

Meanwhile the buildings had been making rapid progress, for we had now acquired skill in bricklaying, making the corners of the walls, etc. During the second term we shall finish our famous cow-house which will play so notable a part in school life at Bierges.

In a subsequent issue of the journal we read as follows:

The Society La Fermière has made considerable progress during the second term, and although the term was a short one the farm buildings have grown apace. As soon as we were back from the Christmas holidays we set vigorously to work, and within a month the walls were finished. Now came the turn of the roof, and the woodwork was all in place by the time the tiles arrived.

I may be allowed a parenthesis to explain that the purchase of the building materials was carried out by the young people, who read up the subject, studied the question of prices, etc., like any adult.

The paving of the interior, and the making of the window frames and of the door, remained to be done. While some were engaged upon the woodwork (for the door and the window frames were made by us at the school) others attended to the paving.

In one of the school yards there was a large stone manger. All the seniors set to work to move it into the cow-house. This took several hours, for the ground was sticky, and the manger extremely heavy. At length, however, our task was accomplished, and while engaged in it we were able to apply with considerable profit what we had learned in the physics class. The manger was cemented to its place, and a second manger was made out of brick. Last of all we had to whitewash the interior of the cow-house. This was now completed, and it only remained to make the liquid manure pit and to prepare the site for the manure heap.

Let me call your attention to the fact that all this work was still done by the pupils unaided.

During the course of the term discussion had been rife concerning the animals we were to keep. The problem was somewhat complicated, for the holidays would come just at the moment when we should have most occasion to be at work in the

fields; it was therefore only possible to have quite a small number of beasts. Besides, our capital could not be said to be large, and it was considered prudent to be modest in our ambitions.

Since then the society has grown, and last year the capital, held in twenty-five-franc shares, attained or exceeded the sum of two thousand francs.

We are to have one cow, one goat, some rabbits, fowls, pigeons, ducks, and bees.

The cow! A new difficulty!! Of what breed was she to be? Belgian or Breton? We read up the whole question. We consulted experts, and were told: "Breton cows are cheaper, smaller, more easily fed, housed, and tended, and their milk is extremely rich. But the calves weigh less and therefore bring less money." We were also told that the change of climate tended to depreciate the merits of these cows.

Belgian cows give a great deal of milk, but milk of poor quality. The beasts are dearer, bigger, and eat more. They are more difficult to tend, especially when calving.

To settle this question we went for advice to a farm twenty kilometres distant where Breton cows were kept. The farmer had nothing but good to say of them and we decided to buy a Breton cow.

I will spare you a number of details and will summarize the rest of the article.

The society bought the goat, the fowls, the rabbits, and the pigeons. Last year the population

of the farm was increased by an additional cow and two pigs. The beasts are, of course, fed and tended by the members of the society, who buy food and litter when necessary, but whenever possible use the produce of their own farm.

Let me explain in a few words the organization of our agricultural society:

(1) It has been founded in co-operative form, each share in the capital being twenty-five francs. All the pupils belong, and as they were anxious that I should also become a member I agreed. One of their number who is destined for an agricultural career has been appointed technical manager, to organize the field work, to arrange for the marketing of the produce, and so forth. There is also a business manager who deals with general questions of finance and keeps the books. These are posted day by day under the guidance of the teacher of commercial science and book-keeping. Pupils intending to adopt a business career can thus gain knowledge that will be of practical help in their future occupation.

(2) The members of the society, the seniors and the intermediates chiefly, do the actual work of cultivation, ploughing, manuring, sowing, and harvesting. Where necessity arises they engage outside assistance, employing agricultural labourers, whom they have to find, and pay. Work in the fields is done twice or thrice a week, sometimes in the mornings and sometimes in the afternoons, this

varying with the season. During the summer term of last year the young people worked in the fields thrice a week from five to seven in the morning. This was their own choice, and I offered no objection, on the understanding that they should have not less than nine hours' sleep in the twenty-four, siesta included.

The pupils likewise tend the animals, seeing that they are fed and watered regularly, turning them out to grass, and littering them down; the pupils, too, milk the cows, etc. A gang of two or three is charged with these duties every week.

In such avocations the children receive lessons in initiative, freedom, responsibility, endurance, and vigour—lessons they will never forget. What an excellent thing it is that they should learn to feel and to understand how all kinds of work, even those which are most distasteful and most humble, contribute generously to the success of every enterprise. No longer do they give themselves airs, no longer are they animated with false pride, for they now have a healthy appreciation of the value of work and of the worker. From the moral and social outlook nothing can be more desirable than this magnification of labour. The child learns not to look down upon manual activities, for he sees that from out the manure heap germinate and bloom all the splendours of the flower. For the rest of life his heart and his mind will become a treasury of affection, kindliness, esteem, and justice, toward those,

no matter their position in life, who create or assist in the creation of values useful to all.

(3) The members of the society build, repair, and keep in order the habitations of the furred and feathered folk on the farm. Besides constructing the celebrated cow-house, they repaired the chicken run, built a hen-house, a rabbit-hutch, a dovecot, a kennel for the watch-dog, a brick drinking-trough, a pigsty, etc.

(4) At first the school was able to buy all the produce of the farm, but the enterprise was assuming such proportions that it had become necessary to think of seeking customers elsewhere. The organization of sales to the general public was in prospect, and without doubt but for the War an expansion would have occurred competent to emphasize the profoundly social character of our pupils' agricultural undertaking. Pending this development, which would have been a logical necessity, the milk, butter, eggs, and other produce of the society were purchased by the school.

I cannot imagine any lesson in solidarity which could be more effective, more intense, and more cordial than this friendly life in which each and all labour for the advantage of our little community.

A work of self-government and co-operation, the school agricultural society serves to initiate the pupils at once into practical and into social life. It effects this initiation through the freedom and the responsibility attaching to the individual members

and through the experience in organization and administration with which it furnishes them.

Fresh air, space, freedom, light, varied and attractive physical and manual activity in a healthy and cheerful environment thus favour the child's development, and promote the acquisition of balance, calm, and energy. All who have visited the school, relatives and friends alike, have been impressed with the tranquil confidence, the wholesome peace, characteristic of our pupils.

You cannot have failed to recognize how these physical activities are potent factors of intellectual, moral, and social development. I must surely have made it plain that such physical training as has been described is the best, the most efficacious, and the most comprehensive preparation for the cultivation of the child's mind, heart, and character.

I shall always recall with emotion the cry of admiration voiced by our physician when, one day, he had been watching the children at work, stripped to the waist, bubbling over with good spirits and energy: " How splendid they are ! "

Not at Bierges alone are the pupils splendid. This is equally true of all the New Schools in which a well-conceived physical education is made the prelude to intellectual and moral education.

CHAPTER II

MENTAL EDUCATION

Man and the Earth—Development of the Child's Needs—Development of the Needs of Humanity—Small Classes—Mobile Classes, Individual Time-tables—Length of the Lessons—Concentration upon a Limited Number of Subjects—Interdependence of the Branches of Study, no Water-tight Compartments—General Culture and Specialization—Class Work, Preparation, Individual Studies—Lectures and Discussions — Library, Collections, Archives, Laboratories, Workshops—Excursions—Reports, Appraisement of Work.

IN my second lecture I should like to sketch the foundations and the methods of mental education as understood and practised at Bierges.

Our material installation, with the grounds, the fields, the orchard, the farm and its live stock, with the laboratories, the studios, and the workshops, constitutes a genuinely living environment, an environment at once real and natural, competent, as Reddie puts it, to serve as an ever-open book, the book of science, art, and morality.

In the school prospectus we have formulated certain fundamental principles as indispensable prerequisites of mental education.

(1) The primary foundation of all is a study of the relationships of the child and the adult to the

earth. Our pupils are brought into direct contact with the various forms of human life and labour; things and living beings are displayed in their natural framework. The child can observe, contemplate, experiment, act, manipulate, create, and construct. In the first lecture I discussed the *rôle* of manual work, and explained the manner in which manual work is organized at Bierges. It would therefore be superfluous to stress the importance of the practical applications of this principle. To bring the child into actual relationship with life, with nature, and with labour, there is nothing equal to manual work.

(2) Next, we adapt instruction and education to the child's natural development. We take into account the needs, the inquisitiveness, of our pupils, so that nothing is presented to them until their intellectual development renders them competent to understand, to assimilate, and to grasp the scope and utility of what is presented. Such is the principle that guides us in arranging our curriculum. It is in accordance with this principle that certain branches of study are undertaken immediately, while certain others (and above all the dead languages) are deferred until later. Moreover, the principle is carried out, not merely as concerns each branch of study considered as an organized whole, but also as concerns the various parts of which each branch is made up. An example will make this clearer. In the study of language, the

usefulness of grammar does not become plain to a child until much later than people are apt to believe, and children may be introduced to the study of their native tongue in ways more appropriate to their age, by the practice of reading and composition. In zoology and botany, again, a description of the external characters of living beings, and an account of their habits, their life, and their usefulness, should precede the study of their physiological characters and of the principles of classification.

If children are really to understand what they are taught and to turn it to advantage, it is essential that the mentality, the predispositions, and the interests of childhood should be taken into account by the instructor. We shall have to consider this question more fully when we come to discuss details of practical application.

(3) Finally, our system of instruction harmonizes, not merely with the natural development of the needs of childhood, but also with the historical growth of the various branches of knowledge.

The natural evolution of the child's needs is but a reproduction of the natural evolution of the needs of the species, of the needs of humanity. Thus the child is made to pass, though obviously at an accelerated pace, through the successive stages that have characterized human progress. It is perfectly logical to make the child's experience the reconstitution of an epitomized history of knowledge, the teacher concerning himself mainly with saving the

pupil superfluous labour or fruitless divagations. To present to the child the various branches of knowledge in the order wherein different acquirements were made, to arrange that the stages of instruction shall correspond with the stages in which knowledge was gained and developed—surely no one will deny that this is the natural and most desirable method? The pupil who passes by these stages, who thus rediscovers the different sciences, who has experimented, acted, sought, and found for himself, does not forget what has been taught. Guided by his teachers, he makes the experiments, the verifications, and the discoveries through which science has advanced to its present level of development. Knowledge being thus acquired in a natural and logical order, it is retained in a manner at once precise, personal, and durable.

A second advantage of this plan is the acquisition of good working methods. If we do not present the systematized science of the adult as a finished structure, which is to be accepted in its entirety, but if we teach the child to reconstruct this whole, this logical complex, by personal experience, the result is that the child has not merely 'learned,' but knows how and why to use the knowledge that has been acquired. The significance of this in actual life is very great, for what matters is, not simply the possession of knowledge, but knowledge how to use knowledge, how to turn it to practical account.

The instruction we give is essentially educative.

We desire, not merely to furnish the child's mind, but to form it. We make unceasing appeal to active collaboration, to curiosity, to interest. We instruct as little as possible, while we lead the child to discover as much as possible by a personal effort of research.

In the realization of these principles we employ a series of methods which must now be expounded.

I. Small Classes

For the practical application of such a system of instruction and education as the one whose principles have been expounded in the foregoing pages, it is obviously necessary that the number of pupils in each class should be small. In large classes there would be inadequate cohesion. In classes of the barrack type, proper working conditions are evidently unattainable. If we are to deal with children in an intelligent manner, if we are to know them intimately and to follow their progress with close attention, we must concern ourselves with small numbers at a time. This is understood in New Schools, and the classes are small.

In 1914, the second year at Bierges, we had at Easter twenty-five pupils. Applications for admission were to hand which would have enabled us this year to increase our numbers to upward of thirty-five. I did not intend in any case to accept more than sixty pupils.

II. Mobile Classes—Individual Time-tables

I must not be understood as implying that individual teaching is the ideal method. This is far from being the case. Generally speaking, class teaching is much to be preferred, for nothing can replace the suggestions, the incitements, the reactions of a social environment in which an appeal is made to all the child's interests, so that it is led to accept with spontaneity the influence of the factors of enthusiasm and emulation which are essential to its intellectual and moral development. It is for the child a pressing and irreplaceable need to live gregariously, at work as well as at play. It is eminently desirable that a child should display an appetite for social life, in addition to healthy appetite in other directions. If the taste for society be lacking, there is something wrong.

There are, however, disadvantages about collective instruction if it be applied to too large a number of pupils at once. The greater the number, the stronger the tendency to stereotype instruction, and this tendency becomes irresistible when classes exceed a certain size. Identical methods of teaching can be adopted, as a rule, to but a small number of pupils, to those whose mental development is characterized by the golden mean. Pupils of exceptional intelligence feel that they are merely marking time, and lose interest; while those whose intelligence is below average cannot follow what is

going on, and suffer from all the disadvantages which press upon the 'laggard.' We must guard against these dangers if instruction and education are to be profitable to all. The best way is to take natural inequalities into account, to make adequate allowance for different degrees of mental development, for varying aptitudes, and for diverse intellectual and organic needs.

For these reasons, in New Schools we have what we term 'mobile classes,' in contradistinction to the classes characteristic of the rigid official organization, in which the pupils are grouped in all subjects alike, without regard to individual advance along different lines. Where the system of mobile classes prevails, the pupils are grouped according to variation in their acquirements, in their capacity for different subjects, so that a child may be in the sixth in French, in the fifth in English, and in the fourth in Arithmetic.

To enable each pupil to attend his normal class and to attend all the classes he should, he works fewer hours at subjects in which he is comparatively advanced, and more hours at subjects in which his progress is less rapid; in some cases, too, where it is possible, without changing the general time-table, we give a little more time to those who keep up with difficulty, in the form of supplementary lessons.

There are various ways of attaining the desired end, and each pupil has his special programme of

study, adapted to his particular aptitudes, to his own intellectual or organic needs.

It is obvious that a considerable staff is requisite for the organization of mobile classes. At Bierges, while there were twenty-five scholars, there were seventeen teachers, including the two master-craftsmen. Most of them were non-resident.

III. Length of the Lessons

The question of the length of lessons is one of peculiar interest, and can be looked at from numerous points of view. The importance and the wide bearing of the problem are due to the fact that a class is not merely a quantitative datum but is likewise a qualitative phenomenon. We are concerned not only with the function of duration, but with the expression of two states of mind, that of the pupil and that of the teacher, and with the relationships between these mental states and the topic of instruction. It follows that in this matter of the duration of lessons we must avoid fixing too arbitrary a limit. Manifestly, however, there is an ultimate limit at the point where work produces fatigue or is no longer competent to arouse interest. Repose is needed, a period of relaxation, during which the powers of will, attention, and interest can be renewed. At Bierges, therefore, after forty-five minutes the lesson comes to an end or is interrupted. Moreover, I need hardly say that the teacher can

stop sooner should he think it wise to do so. Between lessons there is a period for recreation, lasting from ten to fifteen minutes. Lessons begin at 7.55 A.M. in winter and at 7.40 A.M. in summer, ending at 12.15 P.M. in winter and 12.5 P.M. in summer. The final lesson lasts only forty minutes.

Mental instruction occupies the mornings, the afternoons being commonly reserved for manual work, excursions, preparation, and individual studies.

This arrangement is not rigidly observed. I have already explained that on certain days mental instruction and manual work alternate during the morning hours.

Further, at least three days a week, the senior pupils have classes of mental instruction during the afternoon, from 3.15 to 6.15 P.M.

Nor must it be inferred from what has been stated as a general principle that the preparation and other individual work done by the pupils is necessarily confined to the afternoon. In this, as in other matters, when practice can improve upon theory we need not hesitate.

IV. Concentration upon a Limited Number of Subjects

Concentration of attention is essential. If attention be unduly diffused, the results are disastrous, not only as concerns the formation of mind and character, but also in respect of the simple acquire-

ment of knowledge. At Bierges, therefore, we concentrate attention by working upon a very restricted number of subjects at one time.

Nothing could be worse than the system of instruction wherein the child's attention is directed toward an infinity of subjects not connected by any bond, subjects which have no organic and evident relation one with another. To study arithmetic, dictation, reading, history, geography, physics, and perhaps other subjects as well, during a single morning, may be a bold undertaking, but the results will be practically *nil* if there be no common tie between the matters treated in these various branches.

By what method do we avoid this inevitable disintegration of the mind, this dispersal of attention? In the first place, we concentrate in any one term upon a series of branches in a way that enables us to study better and to grasp more thoroughly the subjects with which we are concerned. By these means our instruction can be better adapted to the general environing conditions. During the spring and summer months we have advantageous opportunities for the study of zoology and botany. If more time is to be given to these sciences, less time must be given to such branches as physics and chemistry, which will, in their turn, have been treated more exhaustively during the autumn and winter. But concentration furnishes other advantages, for it enables the pupil to acquire a more

thorough grasp of the subjects studied, to work with greater interest, with better results, and with less fatigue.

Moreover, the concentration thus practised is not limited to a new grouping of the subjects of study during each term, for we have generalized and extended the method. Thus we devote, it may be the entire morning, or it may be part of any one morning, to the study of a single branch, or to the study of a group of intimately related branches. Pupils and teachers are enabled to get to the bottom of the subject of study, to treat it suitably, and to contemplate it from various points of view. For example, instead of during a single morning working at French, mathematics, history, and physics—instead, that is to say, of dealing with utterly disconnected subjects, since we occupy ourselves with but a single branch or with no more than two—we study these more efficiently, at greater length, and without the shocks and the losses of time consequent upon the frequent transitions of topic characteristic of the ordinary school time-table. Let us suppose that we devote a considerable part of one morning, or the entire morning, to French. There is no difficulty in occupying the pupil's mind, in holding his attention so that he will be neither wearied nor bored, for the subject may be approached in many different ways, each making its appeal to special activities. By reading, by recitation, by the study of grammar, by the practice of composition, and by the study of

literature, in succession, we sustain the most lively interest.

During another morning we deal with experimental science, studying by turns chemistry and physics. We have plenty of time for experimental work, for research. Thus only can our labours be truly productive, for it seems to me impossible in the space of one hour to study science experimentally, to allow the pupil to act, to do things for himself. In addition, having sufficient time at our disposal, we can fruitfully engage upon a cycle of experiments, or can undertake a series of observations upon subjects which constitute part of the same chapter. We are able to complete the study of a single department of science, literature, history, or geography, a section constituting an integral whole. Not only is this advantageous for the sake of the work itself, as concerns the methods of acquiring knowledge, but it likewise favours the growth of the intelligence and the development of character, for it gives the pupil a keen understanding of the need for patience, perseverance, and continuity of effort.

The hour strikes. The period for recreation has arrived, and we rest and relax. Then, after a pause, we resume the same subject. Time is thus economized, seeing that we get to work again more rapidly, and that concentration upon the topic with which we are concerned is more earnest. Our work gains in unity and depth, and I am sure that it also

gains in interest. We have literary mornings, scientific mornings, and so on. We have unity in variety.

Effort of this character is demanded above all from the senior pupils, but it is demanded in the junior classes as well. Let us suppose that we have to consider a single animal or a single group of animals for an entire morning. How do we proceed? We contemplate the subject from various aspects; we connect it with items of knowledge common to other branches, such as geography, history, botany, physics, chemistry, etc.; and we appeal to the pupil's various activities—in observation, experiment, reading, elocution, the arranging of notes, drawing, etc.

Interest is greatly quickened by frequent changes in the questions we ask ourselves concerning a particular subject, and also by frequent changes in the forms of expression by which the pupil manifests his reactions. Children are not wearied at all by having thus applied to a single subject, or to a group of subjects connected by organic ties, a sustained effort of attention to which the eyes, the hands, and the ears have all contributed. By devoting ourselves for a longer period to the particular subject, we have made it richer in interest; and we have made it richer also by having recourse to varied activities.

Thus, on the one hand, concentration gives depth to thought and enables us to study the interrelations

between phenomena in a single branch, while, on the other hand, it enables us also to gain in the matter of extension, seeing that we can correlate the distinct phenomena belonging to sundry branches.

V. Interdependence of the Branches of Study —No Water-tight Compartments

We have broken down the water-tight bulkheads by which, in official programmes, the various subjects of study are separated. We have established between them ties of interdependence, of intimate solidarity, of logical connexion. This natural solidarity is essential to the proper understanding of their respective worth, above all on the part of children and of primitive men. Not merely, therefore, do we associate the study of certain branches, as in the case of history, geography, and literature; but further, into each branch taken by itself we introduce details, borrowed from other branches, competent to throw light upon the leading topic and to display it under the most diversified aspects. As a biologist might say, we demonstrate around the central nucleus of the cell all the protoplasmic processes by which each cell is connected with its neighbours. Our aim is to co-ordinate the various branches, to constitute out of them integers easy to grasp and thoroughly alive, and thus to illuminate the matter with which we are concerned.

In the case of all the sciences, a reciprocal loan of

phenomena, of principles, and even of methods, serves to complete them, helps each to explain the others, permits them to practise mutual aid. It must, therefore, be our care that no science shall remain dumb, isolated, motionless, estranged from the rest. The sciences must join hands. An example will show how important and how essential is this co-ordination.

Imagine a lesson on zoology in which the function of respiration has been described without any appeal to chemistry, and without recourse to facts and experiments concerning oxygen and carbon! Within this same department of study, is it not obvious that when we are explaining the characters of the skeletal system, while appealing to physical considerations (since the movements of the bones are incomprehensible to a pupil who does not possess elementary knowledge concerning the lever), we must appeal also to chemistry to throw light upon the composition of bone?

When, from the sciences that are termed natural and experimental, we pass to historical and geographical sciences, we find that like considerations apply. For example, is it possible to understand the history of Egypt unless that history be illuminated by a knowledge of the geography of the country? It is obvious that these two branches, which mutually elucidate, supplement, and explain one another, must be simultaneously considered.

Not only, however, must the different branches of

the programme be co-ordinated in logical relationships and proportions. We have further to establish intimate connections between our class work and our manual work, for, as I explained in the preceding chapter, manual work affords methods of expression and provides means of investigation for abstract knowledge.

VI. General Culture and Specialization

Toward what end is our secondary education directed? Do we desire to promote general culture, or to effect specialization which will fit our pupil for his particular occupation in life?

Our method realizes the synthesis of these two tendencies, neither of which, acting in isolation, can fulfil the true mission of education. I have already said that at Bierges the pupil is prepared for life in a real and virile manner. This implies that all the possibilities of his being must be developed by the methods of an integral education, aiming simultaneously at the formation of the man in general and of the man with a specialized occupation.

General culture and professional specialization must be complementary, must practise mutual aid, must illuminate one another; they must not be distinct or mutually antagonistic forces.

The man of specialized occupation gains greatly by the possession of general culture, for, from the technical point of view, this enhances his skill, his

versatility, and his intelligence; it gives him increased capacity for attention and for reflection; it furnishes him with varied kinds of knowledge, which augment his creative faculties and his means of work. It is well known that the pupils of technical schools begin their studies at these institutions when they are too young to derive full benefit, and that those who stay somewhat longer at the primary school become apprentices possessing a higher faculty for attention and a more solidly grounded education. It is, moreover, a matter of current observation that a workman with an all-round education plies his trade with more intelligence and skill than one who has specialized too early. This is equally true of all professions.

But it is not solely from the technical point of view that general culture is essential to the enrichment of intelligence and of professional skill. General culture is equally necessary from the humanist outlook, for if the technician is not to become a mere wheel in a machine, a thing without thought and without feeling, nothing which concerns other men must be foreign to him. General culture makes its appeal to the mind, the source of all our activities. It enables the worker to appreciate the social significance of labour; it enables the technician to grasp the bearing of his particular activities upon the general current of human life, whereas the analytical and particularist pursuit of

some exclusive specialty tends to isolate him from that current.

We must be careful, as Ferrière points out in his notable *Projet d'École Nouvelle*,[1] to avoid confusing general culture with an encyclopædic, fatiguing, and sterile culture. Moreover, education and instruction go utterly astray when they fail to take into account the specific characteristics of individual pupils, their needs, their interests, and their aptitudes, their individual development, the extent of their existing knowledge, their destined career, etc.

Were it not that I have a dread of formulas, that I am aware that formulas incline always to be unduly vague and unduly narrow, I should be inclined to say that Bierges tends to realize a general system of instruction adapted to individual capacity and individual need, and having a specialist tendency in the case of pupils that have reached a certain age.

The pupils are grouped and the subjects of study are distributed in four sections:

(*a*) Preparatory . .	7 to 10	years of age
(*b*) General . . .	11 to 14	,, ,,
(*c*) Higher . . .	15 to 17	,, ,,
(*d*) Special . . .	18 to 19	,, ,,

It is hardly necessary to say that our classification by age is far from absolute, for the limits vary with

[1] Édition Foyer Solidariste, Saint-Blaise, 1909, published by Delachaux and Niestlé, Neuchâtel.

each individual, and the system of classification is sufficiently elastic to enable us to take this fact into account.

From seven to fourteen years of age general instruction is the same for all. The branches of study are obligatory. They are: natural science, mathematics, native and foreign tongues, history, and geography. Such is the programme of our preparatory and general sections.

After fourteen, in accordance with the natural development of the pupil's aptitudes, we introduce new branches of study, such as the dead languages; or we develop instruction in branches previously studied, such as mathematics, natural science, modern languages, etc., with an eye to the predestined career. Such is the work of our higher section.

Finally, we have a special section which the pupil enters at about the age of seventeen. I do not believe that there is such a section in other establishments for secondary education, whether these are or are not New Schools. It is our aim to give, in a general, elementary, and abridged fashion, in so far as the nature and complexity of the subjects and the technical means at our disposal permit, specialized instruction which will prepare the pupil for the work he will have to undertake as soon as he leaves Bierges.

VII. Class Work—Preparation—Individual Studies

Method is of primary importance in educational work. That which is of great significance for the future career, that which really matters, is not the mere possession of knowledge, but knowledge how to make use of knowledge. This is the knowledge we endeavour to impart. We try to make our pupils understand the need for working well, and for thereby acquiring the faculty, not merely of knowing well that which they learn, but also, and above all, that of putting what they have learned to good use.

How, then, are our classes conducted at Bierges?

You all know how classes are conducted under the old system. The teacher comes into the room, installs himself at his desk, and begins to question the class about some subject which has been learned more or less by rote. The recital of the lesson and the exposition of the subject are equally mechanical. Such and such a lesson has to be repeated. It is a self-sufficient whole, rigid and lifeless; and as the lesson is being said, the teacher concerns himself merely with the particular pupil he examines, disregarding the others. The whole lesson is of the same character. When it is finished, the teacher leaves. Next day the class begins at the same hour and is of the same duration.

Now, a lesson should be something at once more

simple and more complex, more interesting, more vivid. Let me show you what I mean, by explaining the different stages.

At Bierges a lesson is given anywhere, for the class-room is everywhere. Next, a lesson is not a ready-made exposition which the pupil must learn by heart. It is something to be built up; it is something which the pupil must construct for himself, little by little, detail after detail; and he must do this with the assistance of his teacher and of his comrades. I will give a general sketch of our method.

Let us suppose that you are going to attend one of our classes. You enter the natural science laboratory. Around you are terrariums and aquariums, and glass jars containing anatomical specimens. You notice a characteristic odour. But if, instead of coming here, you had found your way into the chemical or physical laboratory, or into any of the class-rooms, you would grasp our principles just as well, for in all the subjects of instruction these principles give rise to similar activities, and the differences are no more than superficial.

(*a*) To begin with, the class draws up a plan of the work to be done. There is a play of mutual question and answer, and as the outcome of the resulting discussion a definite plan of action is secured. We agree to make a number of observations and comparisons upon one, two, or three animals.

(*b*) Now the pupils may leave the class-room to carry out their plan, or, in another case, may remain where they are to engage in dissection or to make anatomical or microscopical preparations—for each one of the pupils has a dissecting outfit, a small microscope, and a hand lens. We are in the second phase of the lesson, which comprises the study of all the details, including observation, experiment, verification, and note-taking. It is carried out in various places, perhaps in a laboratory, perhaps in one of the workshops or studios, perhaps in the open. In the instance now under consideration we have to carry out the plan elaborated in class, to find answers to the inquiries we have formulated, to make the necessary observations. Pierre is going into one of the fields, Jean will visit one farmer, André another, and so on. They set off in every direction to harvest their observations and to glean all possible information.

(*c*) The time allotted for researches has expired. The members of the class return, having made the observations specified in the plan which was worked out at an earlier stage. Speaking generally, the elaboration of this plan and the work of research occupy the greater part of Tuesday morning, which is devoted to zoology. On Wednesday morning we continue to study zoology from half-past nine to five minutes past noon. We are now in the third stage of the lesson, wherein we elucidate the significance of the observations that have been made;

correct badly taken notes or ill-made drawings, with the objects of study before us; and acquire complementary notions by further direct study. Discussion and reading terminate this stage. We now reach the fourth phase, in which we classify, in which we arrange into definitive groups, all the details we have acquired, the results of all our observations and experiments. We proceed to the systematic organization of the lesson.

(*d*) At the close of the afternoon, between 4 and 6 P.M., during the period devoted to preparation, in the appropriate manuscript books the pupil will write notes of the lesson which has been prepared in class by himself, his comrades, and his teacher. This is the last phase of the work.

In some of the classes, that of geography and that of history, for example, certain pupils are commissioned to effect a preliminary study, to clear the ground, before the teacher intervenes at all, and in many cases this work of collecting and classifying details is so admirably done by the monitors that all the teacher need do is to add a few supplementary ideas.

Thus the lesson is something more than the accomplishment, the development, of a series of individual efforts; it is likewise the result of collective work. It appeals, not merely to the pupil's intellectual activity but also to his physical, social, and manual activities.

It is a slice of life, for work done in this way

associates the pupil with everything that is going on around him. The article by one of our scholars, entitled *The Installation of our Wireless Telegraphy Station*, which will be reproduced later, is a lively illustration of what I have been saying.

In addition to work of this kind, in addition to the preparation and organization of those lessons in which all the pupils co-operate, the seniors undertake more extensive individual researches, which they pursue unaided.

VIII. Lectures and Discussions

Each month, in the presence of the whole school and of the relatives and friends of the pupils, addresses upon a set subject are given by one of the pupils and one of the teachers. Discussion follows. In this way, by expounding in public one side of a controversial question, the pupil learns not only how to speak from the platform, but also how to submit to criticism and correction. The lecture, at which the audience consists of his comrades, of his relatives, and of strangers, is to him rather a solemn affair. Here are the subjects of the addresses given last year. The pupils who took part were those of fifteen and upward:

The Port of Antwerp.
Brazil.
The Development of Agricultural Implements.

The Protection of Wild Nature in Belgium, and the Formation of a National Park.

The Installation of our Wireless Telegraphy Station.

Trees from the Economic Outlook.

In the school journal the pupils give their own report of these lectures and discussions.

IX. Library—Collections—Archives—Laboratories—Workshops

If the lesson is to have its full value, if the work of preparation is to be as extensive as possible, and if we are to secure the most profitable return for the processes that have just been described, the pupils must have at their free disposal implements of work enabling them to study under good conditions. In default of certain precious and indispensable adjuvants, we cannot look for the effectual realization of any work of education and instruction based upon the principles expounded at the beginning of this chapter.

Unless the pupils have free access to books, and to laboratories and studios furnished with an extensive armamentarium, it is practically impossible for them to undertake the necessary investigations. Consequently, from its first foundation, a New School must devote its most careful attention to the provision of these essentials.

At Bierges each class has its own library. We

have nearly four thousand volumes, relating to all the branches of instruction. In addition, there are extensive collections of engravings, photographs, drawings, and picture post-cards, which supply the pupils with all kinds of information. We subscribe to about a dozen reviews and magazines. The daily papers, too, are at the disposal of our young people. Here is a precious mine, which can be turned to good account from the educational standpoint by one who has learned how to use it. In the periodicals, accounts are given of social, political, economic, moral, artistic, and scientific happenings. If young people are induced to discuss, to understand, and to explain these events, they receive an excellent and vivid lesson concerning social affairs which a young person should know about and in which he is ready to take an interest. The junior pupils are also provided by the newspapers with information concerning matters within the scope of their attainments. They make cuttings from the daily papers. These cuttings are classified and pasted upon pieces of cardboard, and, renewed day by day, they constitute the daily paper of the school. Each month one of the pupils is appointed by his comrades to fulfil this journalistic function.

The abundance of books, reviews, magazines, and newspapers furnishes us with a wealth of documents. This is all the more necessary seeing that at Bierges we make no use of set text-books. We have declared open war upon the compendium, that

storehouse of fixity and uniformity. Not only do we take this course owing to the nature of our programme, since no manuals have ever been published in harmony with our plan of study, but we are influenced also by spiritual motives. If we are to develop in the child's mind a soundly critical spirit, if we are to create in the pupil a habit of systematic investigation, we must enfranchize him from the intellectual and moral slavery of the manual. Our appeal is to observation, experiment, research, individual discovery by the pupil; what interests us is what our scholars do on their own initiative, what they think on their own account. Our leading desire is that their knowledge should be the fruit of personal experience, organized, co-ordinated, and systematized by themselves. They must draw their data from all possible sources. The use of a single manual of instruction would restrict their thoughts and activities.

Studios and laboratories are equally indispensable, and I detailed in the first chapter our equipment in this respect. I explained that whenever further purchases are necessary for an experiment we do not hesitate to make them. But while it is desirable that scientific experiment and research should, as a rule, be made with instruments of precision, there are certain investigations whose educational value is greatly enhanced when the pupil constructs his own implements.

This is where our workshops can play so useful a

part. As I shall subsequently show, in these workshops every branch of instruction can harvest facts and methods. It is extraordinarily interesting to note how great is the educational advantage derivable from manual work. Nothing can have a profounder moral influence, and nothing can give a more striking idea of human courage and self-reliance, than the comparison which the pupil is able to make between the rudimentary implements he can construct for himself, resembling those made by his remote ancestors, and the complicated instruments of precision with which modern scientific technique equips our laboratories. Just as the pupil can reconstitute scientific evolution, he can reconstitute also the associated evolution of technique. Further, these laboratories and workshops, with all they contain, are entirely at the pupil's disposal; we do not keep things in locked cupboards or in hermetically closed glass cases. There are many schools where there is no scarcity of laboratories and scientific instruments, but where what is lacking is freedom for the pupils to make use of them. The teaching of experimental science takes the form of an experiment made by the teacher in the presence of the pupils. But this is altogether inadequate. One who merely looks on at an experiment learns little in comparison with what he can learn if he perform the experiment for himself.

At Bierges the instruments of scientific research are genuinely at the disposal of the student. In

class or privately, and whether the teacher be present or not, the pupil can engage in any experimental investigation necessary for the work in hand. If he damage or destroy an instrument he will have to pay for it, and he is thus effectively responsible for what he uses.

As previously explained, the library, the collections, the archives, the laboratories, the studios, and the workshops are entrusted to the care of pupils elected each term by the assembly of pupils.

The children enrich our collections by the result of their own researches and labours, and by the things which they bring back from our walks and excursions.

X. Excursions

A few words have already been said concerning the frequent excursions by which we supplement our studies—visits to museums, public monuments, farms, markets, great shops, public works, etc. It will interest the reader to know how these are organized. Let me quote an article on this subject contributed to the school magazine by one of the pupils.

THE PREPARATION OF AN EXCURSION

For some time we have been planning a geographical excursion to illustrate the knowledge of watersheds gained during the present term. Obvi-

ously, it is not enough to understand, to discuss, and to remember what we have learned; we should, as far as possible, see things for ourselves.

Since we are unable to visit Switzerland, Norway, or the United States, and since it is impossible for us to undertake a difficult expedition to the polar regions, the phenomena to which our studies have related could be contemplated by us in no other way than in the numerous photographs we possess. We finally decided that we should go about in Belgium, where we should endeavour to see as much as possible: mountains, plains, different aspects of valleys and of rivers, industries derived from natural resources.

My comrades commissioned me to draw up plans for the journey, which we divided into two sections, each lasting five days. In this way two excursion tickets of five days' duration would suffice.

The first of the two excursions was to take place at the beginning of February. According to the information which I have hitherto been able to collect, I believe myself entitled to say that it will comprise chiefly the districts of the Ourthe and the Amblève, centring probably in Aywaille or Remouchamps. Our leading aim will be to examine the hills, watercourses, waterfalls, ravines; the disappearance of streams; springs, quarries, etc., etc. We shall go to the Hautes Fagnes and to the Baraque Michel, also to Hérou and to the confluence of the two Ourthes. Probably, too, we shall visit Flanders, so that we can study the difference between the sluggish flow of the navigable rivers of this region, whose fall is so gentle, and the almost torrential current of the streams of the Ardennes,

which are non-navigable; and that we may note the differences between the wide and shallow Flemish valleys and the narrow ravines of the Walloon region, known locally as *ris*.

The second section will be mainly devoted to the study of mines (coal, lead, iron, and zinc), quarries (porphyry, marble, and granite), lime-kilns, cement factories, the extensive industries of the coal and iron districts (the glass-works, china factories, potteries, brick-fields, which swarm in this region). Of course this is no more than an outline sketch, in which details are necessarily suppressed.

The suitable preparation of an excursion is a lengthy business. We cannot set out at haphazard, trusting to our guiding star, heedless of what we shall or shall not see. One or two months barely suffice for the work of preparation. First of all you must collect all the books you need, reading them carefully, and noting matters of interest, while adding from time to time some ideas of your own. At the end of this stage you will have a sheaf of papers filled with suggestions. You must now go through these notes, culling the essential ideas and eliminating the remainder, endeavouring to concentrate what you propose to see in two or three localities, so as to avoid needless travel and loss of time. Next it is necessary to consider the material details of the journey: dates, lodging, food, railway journeys, permits of inspection—not to mention all the minor details which take up a great deal of time.

The last stage of all is by no means easy. By lectures or in class the comrades have to be prepared, so that they may gain a better understanding of what they are to see. Last of all, it would never

do to lose sight of the æsthetic and picturesque aspects of the excursion, to overlook the natural beauties of the regions we are to visit, but it will be easiest to decide about these when we see them.

This is a rough account of the way in which I prepared our excursion.

Let me sum up in a few words the principles and the facts relating to the excursions:

(*a*) The class nominates one, two, or three pupils, the number varying with the importance and scope of the plan, to prepare and organize the excursion, alike from the material and from the intellectual point of view.

(*b*) The work of preparation and organization comprehends the following points:

(1) A study of all the data and information bearing on the subject: reading, making notes, etc. This is individual work carried out by the pupils commissioned to prepare the journey.

(2) The classification of these data, the selection of the essential notions and the elimination of those that are unsuitable, the localization of the places to be visited in two or three centres, so that needless travelling and loss of time may be avoided. This part is done collectively by the excursion committee.

(3) The results are now presented to the class, so that each pupil may contribute his particular ideas and may grasp the nature of the design. In many cases the discussion is extremely interesting.

Further meetings ensue, at which the members of the excursion committee give readings and brief lectures, preparing their comrades for the understanding of everything they are to see.

(4) It need hardly be said that during the excursion the organizers will, as occasion arises, have to furnish all necessary information and supplementary explanations. They act as guides to point out and illuminate the common road; as junior teachers who, with the assistance of their elders, play their parts admirably.

(5) The organization of the journey in respect of practical details likewise involves numerous responsibilities. Dates have to be fixed, questions of food, lodging, railway tickets, and permits to view have to be considered; an estimate must be made of the cost, for the organizers will attend to financial details and similar matters during the journey.

(6) When the excursion is over, much work still remains to be done, for there is a logical sequel which it will be interesting to explain. The class assembles to commission the pupil or pupils who organized the affair (should the matter appear to be worth the trouble) to give lectures describing the excursion to an audience consisting of schoolfellows, relatives, and friends, and to organize an exhibition of photographs, picture post-cards, drawings, notes —in a word, all the material collected on the journey. A synthesis is effected, a vivid picture

of the work done, displaying the results that have been secured.

After the lectures on prehistoric times given by some of the pupils to an audience of relatives, we took these to see an exhibition we had organized relating exclusively to prehistoric times. Within two days our studio for modelling, cardboard work, and drawing had been transformed. We had arranged round the walls some improvized easels, displaying in chronological order quite a number of prints, drawings, and photographs of prehistoric dwellings, also tools, ornaments, weapons, etc. In addition, we exhibited collections of fossil plants and shells found by us during our excursion or given to us by friends. One of our teachers had drawn for us a large picture representing a prehistoric family at work. . . . This exhibition enabled us to familiarize ourselves pictorially and by the examination of actual objects with all that has preceded us in the world, and we could thus make a profitable start upon the study of history.

(7) But perhaps you will ask me what part the teacher plays in all this. Before the excursion he contributes to the work of research, to the acquisition of data. During the excursion he supplies information and explanations which the organizing pupils are unable to furnish, or which the other participants are unable to understand without the teacher's aid. By no means does he replace the pupil or do the pupil's work; his function is to

guide, enlighten, correct, and supplement. Nor should he try to do more than this if it be true that the child's knowledge ought to be the fruit of organized personal experience.

XI. Reports—Appraisement of Work

We have studied the principles in accordance with which our pupils work. Let us now consider how the value of that work is appraised.

At the end of the term we send to parents a brief report of the pupil's work. In addition to notes upon physical development, this report contains numerous psychological observations upon the child's manual, intellectual, and moral aptitudes, upon the branches he has studied and the number of hours given to each, the reasons for progress or arrest, and so on.

We observe our pupils very closely, and since we furnish them with manifold opportunities for activity, since the school environment is brisk and varied, we are enabled to take note of their characteristics, tastes, interests, and habits, and are in a position to sketch psychological portraits in outline.

My fellow-workers assist me by making their own observations, taking regular notes and placing these at my disposal. In view of the limited number of pupils, it is thus possible for us with little difficulty to adapt to their respective individualities our methods of education and instruction.

In a tactful and cautious manner the pupil is kept informed of what we think of him, for it is desirable that he should become accustomed to recognize that his activities are under observation and that they are appraised. It is necessary for him to understand that he is not perfect.

To develop the pupils' critical spirit, to encourage in them sentiments of justice and equity, I have established at the school an organization whose results have proved peculiarly gratifying. At the end of each term we undertake the appraisement, not merely of the work done by the pupil, but likewise of his moral and social life. Whereas in the ordinary school such reports are drawn up by the teachers alone, ours are made with the assistance also of the pupils, including the person chiefly concerned. Moreover, the report relates to the pupil's efforts, not in comparison with those made by his classmates, but in comparison with his own efforts, with the results of his earlier work. The last week of every term is devoted to this matter. Each pupil is asked to appraise his own work, and our observations are recorded upon a numerical scale. The words ' good,' ' bad,' and ' indifferent ' give far less precise expression to what we want to say than figures, for although figures are incompetent to denote complex psychological values, they render it possible to indicate certain gradations, certain shades of difference, which it is desirable that the pupil should clearly recognize.

Here is a class in which teachers and pupils are engaged in this work of appraisement. "Now, Peter, have you worked hard? Have you made any progress? What is your estimate of your work?" The pupil has to say what he thinks of his own efforts, to select a number from a scale of values; it may be twelve or thirteen, or seven or eight—the number which in his view expresses the worth of his endeavours. His classmates are invited in their turn to select the number which seems to them best fitted for the occasion. Then only does the teacher intervene, criticizing what has been said by the others, giving his own opinion and his personal numerical valuation. The number finally chosen is the mean of all the others. Let me repeat that this system is not confined to the appreciation of class work, but that all the pupil's vital manifestations are similarly appraised: orderliness, care of the person, consideration for others, companionableness, straightforwardness, etc.

The advantages of the system are obvious. It renders the pupil fully aware of his progress and of his defects, helps him to discover his weak points, aids him to estimate his powers and capabilities, accustoms him to introspection, to an examination of conscience. The pupil is induced to appreciate his own endeavours, not in relation to his comrades, but in relation to himself. When we invite classmates to give their opinions on one another, our aim is to arouse in their minds sentiments of justice

and equity, to teach them to exercise their critical faculties, accustoming them to use these tactfully, cautiously, and considerately, but also frankly.

Our reports, therefore, do not consist solely of observations made by the teachers, but comprise in addition observations made by the pupils, for since the individual pupil's work is the outcome of individual endeavour, and since its good results are in large part due to the collectivity of the class, it is logical and right that the class should collaborate in appraisement.

CHAPTER III

CERTAIN METHODS OF INSTRUCTION

Zoology, Botany, and Geology—Physics and Chemistry—Mathematics—Languages—Geography—History

I PROPOSE to write in due course a monograph dealing with the methods we employ in teaching the various branches. In the present general sketch no place can be found for the numerous details appropriate to a didactic treatise. I must confine myself to practical, general, and summary indications, which will suffice, I hope, to give an adequate understanding of the manner in which our programme is carried out.

I. Zoology, Botany, and Geology

The teaching of natural science constitutes the essential foundation of intellectual education in our preparatory section, where the pupils range from seven to ten years of age. The natural sciences are especially suitable to the needs and to the mental interests of young children, most of whom, as Herbert Spencer justly points out, are naturalists by instinct. Moreover, during the formative period of preparation, these sciences play an extremely

important part in promoting the acquirement of habits of industry, of a critical sense, and a faculty for scientific investigation. The natural sciences bring the child into direct contact with the realities and the forms of nature and of life (realities and forms which arouse the child's passionate interest by their movement and their colour), and with the realities and the forms of human labour employed in turning natural forces to man's account. The latter side of the question is equally interesting to the child, for its need of action, its desire to make things, can find herein manifold applications.

In teaching these branches we are guided by the following principles:

(1) The first essential toward making instruction in natural science vivid and interesting is that it should be concrete, and with this end in view we bring the child into direct contact with natural phenomena. We do not teach zoology from books with the assistance of more or less diagrammatic drawings, of comparatively inert objects, but we have recourse to the study of concrete and living realities. Observation and experiment, whilst constituting the foundation of all our instruction, are in addition inspired by the following considerations.

(2) We draw attention, first of all, to the most salient characters, the most obvious aspects, of animals, plants, the world. We begin, for example, by studying the external characteristics of the

body of some animal, its needs, its diet, its habits, etc.

(3) We begin, likewise, with the study of our immediate environment, and only when that is known do we direct attention to more distant environments, to those of other lands. We commence with the geological strata of our own neighbourhood, examining the alluvial deposits in the school grounds, the strata displayed in adjacent properties, and so on.

(4) It will be seen that these studies have an eminently practical character. The children learn what services animals and plants render to man, how their products are utilized, how raw materials are transformed in manufacturing processes, etc.

(5) But we must not rest content with a simple accumulation of memorized facts. It is necessary that general notions should gradually be acquired. The work the children do in their garden plots encourages them to make comparative observations, to note the resemblances and differences between the various phases of development of the plants they watch growing. Similarly in the case of animals. They study the metamorphoses of the frog, preserving in spirit examples of the separate stages of growth: ova; tadpole with external gills; tadpole after the external gills have disappeared; tadpole when the front paws have grown; tadpole almost completely transformed into a frog; frog.

In a different domain, comparisons will be made between our own cows and those kept by our neighbours.

(6) Through regular observations and comparisons we are enabled ultimately to arrive at generalizations, synthetic groupings, classifications. From the outset these are precise in character and have a definite aim. Thus, without leaving the school grounds, we have been able to classify more than sixty species of trees, and our inventory of these species is illustrated by a table displaying the foliation, the inflorescence, and the defoliation of each.

(7) With the study of any animal or plant, or of any geological phenomenon, we associate all the attainable related knowledge in the domains of physics, chemistry, geography, history, etc. With this study we likewise associate manual work, and in especial, drawing, cardboard work (making boxes in which to keep specimens), modelling (models of plants and animals), carpentry (making of terrariums, etc.).

(8) Observations and experiment are carried out under conditions and are made with the aid of means which require fuller description.

A school situated in the country has for the study of natural science, and for the conduct of observation and experiment in this field, an exceptionally favourable position. By a natural transition the child can pass from aimless observation to the

deliberate and methodical study of nature, and of the surrounding life which makes such numerous appeals to his interests.

Let us consider first of all the study of *zoology*.

(a) *The Farm. The Poultry-yard. The Apiary.*— I have explained that the pupils tend various animals: cows, pigs, fowls, pigeons, ducks, rabbits, a goat, dogs. They feed these, watch their mode of life, study their growth, lend a hand at calving-time, set eggs. They collect the produce of the farm, and undertake the transformation of raw materials into manufactured articles, making butter, cheese, etc. Let me quote a description from the school magazine:

OUR COW

Last year our agricultural society had determined to buy a cow after the holidays; but to give us a surprise they bought her sooner. How great was our astonishment, when we went into the cow-house, to see there a beautiful little Breton cow. Her great black eyes, her pink nose, her splendid curving horns, her black and white hide, made me fall in love with her.

Really, I am extremely fond of this animal. Although we are told that cows are stupid, I consider that our cow is clever. How she looks at us when we go into the cow-house at feeding-time without bringing her fodder! But happily we do not keep her waiting long.

Her calving was a great event. For some days there had been talk of sitting up all night to tend

her. Unfortunately the day she calved we all arrived too late.

But the pupils were able to attend the calving of the second cow, the one bought at a later date.

Roses have thorns. It is all very well to have a cow, but the beast has to be tended, to be given fodder five times a day, to be littered, milked, etc. Week by week two pupils are appointed to attend to these duties.

Breton cows yield on the average from two to three gallons of milk daily, whereas Belgian cows yield from four to five gallons. But the latter's milk is much poorer, so that proportionally the yield of butter is less. To man, the cow is one of the most useful of animals. She gives him milk, from which butter and cheese are made; her flesh, the flesh of her young, and even her bones and horns, are of great use in manufacture. Consequently the beast possesses high commercial value and should be treated more humanely than is customary.

It would be an excellent thing to establish a number of model farms in order to instruct ignorant peasants in hygienic methods of cow-keeping, and also in order to teach them how to improve the breed.

Here is another extract:

THE SCHOOL ANIMALS

We have a number of animals at the school, among which may be mentioned the two cows,

the pig, the dogs, the fowls, the pigeons, and the rabbits.

The two cows are stabled in the cow-house built by the pupils last year. One, the first we had, is a dear little Breton, black and white, extremely gentle. We have called her Pâquerette [Daisy], since she came to us at Easter [Pâques]. The other is a great big Belgian cow; she is white and jealous. She is known as Mammoth because of her enormous size.

The watch-dog lives in a brick kennel beside the farm; he is a good old brown beast; his name is Bergeot. The black bitch is quite young and loves to be off the chain; she is known as Top. Her kennel was made by the juniors last year.

The pig came the other day; he is pink all over, and very small; his ears hang down over his eyes; I regret to say he has not a corkscrew tail.

The hens are housed close to the farm buildings, and have a special run; there are many different kinds; they lay a lot of eggs every day; there are also some cocks.

We have now twelve pigeons; some are blue and some are white; they are fed on maize and wheat.

We have an apiary, and can make interesting observations on bees.

(b) *The Terrariums and the Aquariums.*—The terrariums provide the pupils with another field of zoological study. We have several terrariums, and they contain the following animals: white mice, a hedgehog, a tortoise, some lizards, a

slow-worm, a Caucasian snake, an adder, and some salamanders.

There are also members of the insect world: carabidæ, cockchafers, crickets, ants, burying beetles, dung beetles, and all kinds of larvæ and caterpillars.

In the aquariums we reproduce as closely as possible the natural environment of the various inhabitants. These are:

(1) Fish: gold-fish, carp, tench, perch, catfish, loach, stickleback, *Idus melanotus*.

(2) Batrachians: toads, frogs, tadpoles, newts.

(3) Aquatic insects: hydrophilidæ, water-beetles, water-boatmen, etc.

(4) Molluscs: common snails, pond-snails, planorbidæ, etc.

(5) Worms, leeches, etc.

The pupils undertake regular observations of these animals, keeping notes upon their peculiarities in respect of food, habits, dwellings, external characters, etc. Let me quote once more from the school magazine:

THE AQUARIUMS

At school I am in charge of the four aquariums. The first contains newts; these animals live on earthworms and mud, fighting with one another for their food; they are both aquatic and terrestrial, and I have arranged some stones close to the water.

to enable them to leave it. In the second aquarium I have some specimens of *Idus melanotus*, which live on small aquatic animals, earthworms, and mud; they are silvery, like sardines, with the tip of the tail and of the fins slightly tinted with red; they are extremely greedy, and when I pass in front of the glass of the aquarium they press their noses against it as they try to follow me with their eyes. There is also a variety of perch, flattened and of an oval shape; they have a bluish sheen and are remarkable for their voracity. They eat so much that I can never satisfy them: they are always hungry. The worms thrown into the aquarium are speedily disposed of, and unless the perch were kept apart from the loach, the loach would have been devoured long ago.

The third aquarium contains some young *Idus melanotus*, some tench, and some catfish; the catfish are nocturnal, sleeping during the day among the aquatic plants and the stones; in the evening, toward 5 or 6 P.M., they emerge in search of food; their mouth is garnished with eight barbels, which form their chief tactile organs. The tench are sluggish; they have a greenish sheen and are not notably voracious.

Loach and stickleback live in my last case. The loach are extremely small, the largest being barely two inches in length. They also have barbels, but very small ones. These little fish have a most remarkable method of breathing: when the water they live in is too impure they stick their mouths out and swallow a lot of air, simultaneously discharging from the anal orifice bubbles of carbonic acid, an irrespirable gas. The stickleback are

very small. For self-defence they erect the spines which at ordinary times are folded along the back. They make nests, but unfortunately they have never made one in the aquarium.

(c) *Practical Work.* — The practical study of anatomy and physiology is pursued by means of dissection. The pupils also make anatomical preparations for permanent preservation.

(d) *Experiments.*—It need hardly be said that zoological study is completed and vivified by experimental work, including the observation of movement, circulation, respiration, digestion, etc.

(e) *Excursions.*—Since our grounds have an extent of fourteen acres, including the arable, the wood, the pleasure garden, the kitchen garden, the orchard, the pond, the stables, and the cow-house, there is sufficient to satisfy the needs of a rich and varied instruction. But we undertake excursions further afield, to observe in their natural environment the beings and things which interest us. We study zoology, botany, and geology wherever we go; and wherever we go we keep our eyes open for matters that will repay study.

When it is desirable that the pupils should examine foreign and tropical fauna, they have an excellent opportunity in their visits to menageries at Brussels, to the Zoological Gardens at Antwerp, the Brussels Natural History Museum, and the Tervueren Colonial Museum.

The school magazine gives us an account of some of these visits.

AVICULTURAL EXHIBITION

We have been to visit the avicultural exhibition at the Palais du Cinquantenaire in Brussels. As we entered we heard a concert of animal cries which racked our ears. This made us think of the old story of the Bremen musicians, among whom were a donkey, a dog, a cock, and a cat, singing in choir.

The birds interested us very much; there were all kinds of cocks, both large and small, hens, ducks, turkeys, peacocks, pigeons, and parrots. There were some very funny cocks and hens; their legs were covered with tufts of feathers, which made them look as if they were wearing trousers. We looked at the incubators and artificial foster-mothers, and saw poultry-houses of all sizes and various models. We saw likewise several kinds of rabbit—some of them were very nice, with very long ears—there were little wooden houses for them to live in, and there were machines to cut up the carrots in thin slices. The avicultural exhibition was splendid.

THE TERVUEREN COLONIAL MUSEUM

This museum has an imposing appearance and I was much interested to visit it. At the entrance there is a rhinoceros, who seems to act as hall porter. In the first hall there are chiefly giraffes, elephants, and apes, some of the apes being as large as men.

The other halls contain important collections of fish, birds, insects, and stones.

But I found most interesting of all the room containing the weapons, tools, and other implements used by savages, for these things give one a very good idea of the strange life they lead. Extremely interesting, too, were the rooms showing how rubber is collected, with different kinds of wood from the Congo, and various other imports.

Everything is very well arranged, and we were charmed with our visit.

Another pupil writes:

To inform ourselves *de visu* concerning prehistoric times and zoology we organized an excursion lasting five days. We went to the Antwerp Zoological Gardens. We had a guide-book and visited all the houses. Subsequently we paid a very interesting visit to the Brussels Natural History Museum.

In *botany* similar methods have produced similar results. Our studies are vivid and concrete. The school grounds furnish us with ample material. The work done here by the pupils gives them an opportunity of studying the external characters of plants and the processes of plant development. Moreover, while digging, manuring the ground, sowing, and reaping, they gain practical knowledge of the entire technique of agricultural work, involving numerous applications of physics, meteorology, chemistry, etc.

(a) *The Pupils' Gardens.*—Apart from general work in the fields and the gardens, each of the junior pupils has a garden plot of his own. Here he cultivates whatever vegetables and flowers he likes, and here he acquires detailed experience in hoeing, draining the land, propagation by cutting, layering, and grafting; here he makes observations upon the effects of exposure, of different manures, of light, etc. These methodical and sustained observations are duly recorded in notebooks.

(b) *Practical Work.*—By plant dissection, by laboratory experiments (upon roots, branches, leaves, seeds, etc.), by classificatory work, the pupils are enabled to approach the problems of vegetable anatomy and physiology under peculiarly instructive conditions.

(c) *Excursions.* — In the Brussels Botanical Gardens, in the Museum of Forestry attached to these gardens, in the great hothouses of the Ghent district, and in the Tervueren Colonial Museum the pupils can appreciate the most interesting features of foreign and tropical vegetation. Botanical study is supplemented by visiting private establishments, great agricultural exhibitions, and factories engaged in the transformation of raw materials of vegetable origin.

In *geology* we use similar methods. In experimental work we reproduce various geological phenomena displaying the geological action of the

atmosphere (disintegration of rocks through frost, etc.), of water (infiltration, denudation, etc.), and showing the movements of the soil, etc., etc. In our walks and excursions we lead the children to make direct observations upon the most diverse geological phenomena. We visit sand-dunes, quarries, mines, grottos, railway cuttings. We study the excavations made for foundations, wells, etc. We examine the stratification and sedimentation of rocks, and we note the phenomena of erosion displayed upon the hill-sides, in sunken roads, etc.

In this department also our methods can best be illustrated by allowing the pupils to give their own account of them.

EXCURSION TO FURFOOZ

. . . Next day we took train to Namur. Between Namur and Dinant the Meuse valley is magnificent, with its precipitous rocks and its cliffs. From Dinant we made our way to Furfooz, a splendid walk. We followed the Meuse as far as the confluence of the Lesse, and then followed up the Lesse to Walzin. . . . On reaching Furfooz we visited the various curiosities in the neighbourhood: the grottos, the well, the steaming hole, and the Roman camp. The grottos are quite small. We carried lighted candles. It was very amusing; with a little imagination we could take ourselves for prehistoric men. The well is a natural siphon communicating with the Lesse. The water in it stands at the same level with the water in the river, rising when the

Lesse is swollen by rains and conversely. The surface of the subterranean waters lies at a depth of fifty feet, and the entrance to the cavern is through a hole half hidden by rocks. The steaming hole lies between the Lesse and the well, upon a hill-side, and you reach it by goat tracks. It is said that the steaming hole communicates with the subterranean waters between the Lesse and the natural siphon. It owes its name to the way in which steam escapes from it in winter, by a similar phenomenon to that which characterizes the human breath in cold weather.

EXCURSION TO UCCLE

First of all we went toward Uccle to examine an excavation of great interest from the geological and archæological outlook. It was about four hundred yards long, a hundred yards wide, and twenty-four feet deep. We went into it down a narrow track, which was at first extremely steep. We obtained a few geological specimens for our collection, but the best ones had already been taken away by geologists.

VISIT TO A PORPHYRY QUARRY AT QUENAST

There are two very different ways in which the earth's crust has been formed. One of these is by the laying down of sedimentary rocks in ancient submarine deposits, and this is obvious all over Belgium. But the other method, the formation of eruptive rocks, can be studied at two places only, not far from one another, Quenast in Brabant and

Lessines in Hainault. Porphyry is found in a very restricted area, and there is hardly any outcrop. It has been necessary to remove, by means of excavators, a stratum of clay of varying thickness. Porphyry is greyish-blue in colour, sometimes brownish from the presence of oxides, and can only be cut very roughly. Its sole use is for road paving, and it is employed for this purpose throughout Belgium. Some of the stone is exported for the same purpose. At Quenast there are two quarries, the 'old' and the 'new.' We visited both, beginning with the new quarry, which is smaller, since it was more recently opened. Taken all in all, the two quarries are very much alike, but the old quarry employs 3250 workmen, the new quarry no more than 500. The engine-house of the large quarry is huge. The quarry is 1100 yards long, 550 yards wide, and extends to a depth of over 300 feet. So gigantic are its proportions that when one looks into it from the top the men at work in it seem as small as flies—at first, in fact, one does not see them at all. The interior is terraced for convenience of working. The stone makes up a united mass, cut up in a manner more or less rectangular by blasting. It is hewn into large slabs, and loaded upon trucks which are drawn up inclined planes through a tunnel to the place where the stone has to be worked. The total length of the great chains by which the trucks are drawn is nearly twenty miles. The thatched huts where the men work, arranged in rows, occupy more than fifteen acres. Here the large blocks are fashioned into neat rectangular paving-stones and are loaded upon railway trucks for the market.

Sixty-five millions of these blocks are sent away from the quarry every year. The residual fragments are passed through a stone mill and broken into material of various sizes, ranging from the stone used as ballast on the roads down to the fine powder which is employed for making reinforced concrete.

A hundred and four men are constantly at work at 52 forges making the drills used to bore holes for the reception of the explosives. The smiths also undertake the numerous repairs on the plant.

There are several dining-halls for the workmen. These are well arranged. One seats 900 men, another 1200. A steam heater runs along each table, at which they can warm up their food.

VISIT TO A SLATE QUARRY AT BERTRIX

Our last day was devoted to visiting a slate quarry. We reached Bertrix after an interminable journey. The quarries, we learned, were a good half-hour's walk from the village. On the way a young quarryman who accompanied us gave us to understand that the quarries were dangerous; nevertheless, we went on.

The road was very pretty. In the distance we could see the hills overlooking the Semois. The footpath ran beside a wood and led past the two quarries. Our guide advised us to visit the smaller one, saying we should have a better reception there. We were, in fact, welcomed most cordially, and were reassured about the danger. It would be

all right to go down into the quarry if we were reasonably careful.

First we witnessed a blast in a sloping shaft, recently begun, and intended to ventilate the underground galleries. We then took advantage of the hour during which the workmen leave the quarry to make our own descent.

Each of us carried a small acetylene lamp lent by the quarrymen. The entrance to the mine was by way of a shaft descending at an angle of 45° and running straight downward to a depth of 250 feet. From it numerous lateral galleries diverged. The uppermost of these, 65 feet below the surface, was the one we visited. It runs almost horizontally, but here and there we had to climb one ladder or go down another. There was ample time to examine the strata by the light of our lamps. The stone is blue-black, and is deposited in thin layers, which are easily separated. The quarry is worked in the following manner. When a gallery has been begun and the stone is found to be slate of good quality, blasting operations are carried out in the direction of the strata (which lie here at an inclination of 35° to the horizon) to make a chamber in which the men can work. From this, blocks weighing two to four hundredweight are removed, and are loaded upon trucks in which they are drawn to the surface.

The cavities are partially filled with debris, so that the floor upon which the men stand remains always at the same distance from the surface they are cutting.

Sometimes quite extensive subterranean cavities are thus excavated, the roof being sustained solely by a few pillars of unworked material.

So strong is the slate that there is no danger in having these pillars sixty to seventy yards apart.

The greatest depth of such mines rarely exceeds 850 to 900 feet, for lower than this the stone is too hard to be of any use.

Now let us return to the light of day.

We pass a series of huts, and in these the men are now again at work. There are four in each. One workman, using an iron implement and a heavy hammer, divides the stone into blocks of suitable dimensions; the second splits these blocks into thin layers; the third cuts them into shape; the fourth finishes them.

In one of the huts two machines are trimming the edges of the slates, for there is much less loss of material when this is done by machinery. Outside are stacked, ready for the market, slates of various sizes and shapes.

The description of these visits show how clear, precise, and enduring is the knowledge of things that have been seen at first-hand in their natural setting. Vividly impressed on the memory, they are able successfully to resist the levelling flood of oblivion.

I have now to speak of some adjuvants common to the three branches.

(a) *Collections.*—These are absolutely indispensable. They fix the ideas that have been acquired, materializing them in palpable form. Stimulated by such objects, the pupil looks at them frequently, and his interest is kept alive. But two conditions

are essential. In the first place the collections, if they are to inspire a natural interest, must be made by the pupils themselves. Secondly, they must as far as possible represent the real environment, the natural framework, of the objects in question, animal, vegetable, or mineral, for an abstract and artificial arrangement is fatal to the persistence of interest. I quote from the school magazine:

MY INSECT CASE

Last year every one of us juniors made a cardboard box in which to keep the insects we catch. Mine were dragon-flies, water beetles, and hydrophilidæ. When we have studied them we like to keep them. But instead of pinning the insects into the box, as is done in ordinary collections, I have arranged mine in a different way. My box represents a lake containing a small island, for my insects live in the water, and the dragon-flies are hovering over the surface. In the same way all my comrades had boxes showing the places in which the insects live. There were boxes for crickets, cochineal insects, carabidæ, burying beetles, dung beetles, etc.

(b) *Manual Work.*—Cardboard work (making herbariums, insect cases, etc.), modelling (plants, animals, etc.), carpentry (making terrariums, etc.) are, as has been said, constantly associated with draughtsmanship (of primary importance), to enable our young naturalists to fix, express, and illustrate their acquisitions and discoveries.

(c) *Natural History Society.*—This society (*supra*, p. 57), independently of class work, co-ordinates the efforts of those who are specially interested in natural science, organizing walks, excursions, and nature festivals, encouraging the more detailed study of subjects bearing on natural history, producing monographs on various plants and animals, etc. The society meets at regular intervals. An essential preliminary to membership is the presentation of a record of work based upon individual observation or experiment.

(d) *Materials for Practical Study.*—For practical work in zoology, botany, and geology, each pupil has the necessary outfit for observation and experiment: a small microscope, a hand lens, forceps, a dissecting outfit, a geologist's hammer, butterfly-nets, flower-presses, etc.

II. Physics and Chemistry

In these departments also we realize the principles dear to us, appealing to the child's individual activity, inducing it to observe and to experiment with the phenomena of concrete reality, to elaborate explanations, to effect syntheses, and to formulate general ideas.

(a) *Observation and Experiment.*—Physics and chemistry are experimental sciences, and the pupils are therefore brought into direct contact with phenomena. Purely verbal instruction is pro-

scribed. The laboratories constitute the centre, the focus, from which the students radiate, in order, as necessity arises, to make observations and experiments elsewhere.

(b) *Character and Course of Experiment. Part played by the Teacher.*—The general principle as concerns experimental study is that it should have the character of personal investigation. Each pupil, with a text enumerating the experiments to be made, should investigate the phenomena for himself, preparing the apparatus and making the necessary dispositions, verifying principles, and deducing laws. He must rediscover, must reinvent. Working alone, the pupil is compelled to find his own way through difficulties; he must think and act for himself; and this individual activity is of the first importance in promoting manual dexterity and the growth of creative faculty. All that the teacher has to do is to guide the pupils, to watch the course of their experiments, but not to think and act on their behalf. In our view, when the experiment is merely made by the teacher in the presence of the students, there is not, properly speaking, any instruction in experimental science at all. Our students do not learn by hearsay, nor by seeing other people do things, but by thinking and acting for themselves.

Here is the course of an experiment. Each pupil has a leaflet, or syllabus, giving a brief account of the operations to be performed. These indications

are inscribed at the head of a series of columns which the pupil has to fill in.

(1) Text of the experiment to be made.
(2) Necessary precautions; dangers, etc.
(3) Essential apparatus.
(4) Description of the course of the experiment; observations, notes.
(5) Deductions.
(6) Sketches of the instruments used.
(7) Practical applications.
(8) The formulation of alternative procedures, with different experiments and different instruments, whereby the same principle may be verified. (This rubric frequently reveals facts of extreme interest as regards the pupils' equipment in respect of scientific method.)

The conclusions resulting from a large number of observations and experiments are subsequently associated, co-ordinated, and systematized into a scientific whole, with the aid of explanations and supplementary details furnished by the teacher.

In addition to experiments individually performed, there are collective experiments which are made when, for educational or other reasons, it is desirable to associate the efforts of individual pupils to attain a common end. But it need hardly be said that, in this collective organization, while each pupil is allotted an individual task in accordance with the principle of the division of labour, each one,

by means of frequent discussions, is kept in touch with all the details of the operation.

Quoting once more from the school magazine, I propose to give two examples of experiments which required collective work on the part of the class. They serve, in addition, to demonstrate the way in which our instruction is based upon the individual activity of the pupil.

FOUCAULT'S EXPERIMENT

This experiment was made in the modelling workshop, in former days the chapel of the château. On December 21, 1912, in the morning, after we had been at work for several days, the preliminaries to the experiment were completed. We made a circle one metre in diameter. This was a small ridge of cement on which the bob of the pendulum was to trace a record of its course. The pendulum was suspended from a piece of wood attached by means of plaster round a moulding originally intended to hold a chandelier. The centre of this piece of wood was perforated by a hole into which fitted a wooden plug, split for the attachment of the thread sustaining the bob.

The bob was made of lead, and had been cast at the school forge the evening before the experiment. Through the centre of this leaden bob there passed a piece of iron wire pointed at one extremity and hooked at the other, the hook being for attachment to the thread. The pointed extremity was to trace marks upon the cement ridge. The weight of the bob was 1400 grammes.

The length of the pendulum, from the point of suspension to the centre of the bob, was 582·5 centimetres.

In the morning, therefore, on December 21, 1912, we burned the thread by which the bob was attached to a nail in the wall 245·9 centimetres from the centre of oscillation, and our pendulum began its prolonged swing in the presence of all the pupils, both seniors and juniors, and of the professors. The experiment was successful, and we were quite convinced that the earth was still rotating on its axis.

THE INSTALLATION OF OUR WIRELESS TELEGRAPHY STATION

Last year there had been some vague talk about installing wireless telegraphy at the school. During our studies on electricity the question was rediscussed. At length, when we returned from the Easter holidays, we came to a decision and ordered the apparatus. While awaiting its arrival we studied the question at some length. I shall briefly recall that the receiving apparatus for wireless telegraphy consists of an antenna for the reception of the waves dispatched from the transmitting post. These waves are conducted through a wire to a ' self-induction ' bobbin. From the bobbin a transformer, consisting of coils whose number varies with the distance of the transmitting station and the wave-length of the wireless waves, conducts these to a coherer consisting of a crystal of galena. Finally the waves are earthed through a wire.

When the apparatus arrived, the first question was: " Where shall we fix the antenna ? "

Some considered that we should employ as standards the tall poplars in our garden. Others suggested that the antenna should be fixed above the roof of the school, the standards being made of iron and cemented into the walls.

After a number of proposals had been made the idea suddenly occurred to us to utilize the open space of our lucerne field. The antenna was to be supported by two standards, and it would thus lie across the meadow. This having been agreed to, two pine masts nearly forty feet high were erected, one fixed to the wall of the physical laboratory and the other attached to the gable of a peasant's house. But the man having raised certain difficulties, we had to remove the second mast. It was all the better. We planted it fifty feet higher up upon our own agricultural land, across the common.

Permission to stretch our wires over the road was given by the " Council of Burgomasters and Aldermen of the Commune of Bierges." We ourselves went to the secretary to ask for the permit.

The next step was to decide upon the methods by which the antenna was to be fixed to the masts. We forged two iron collars attached to the wood by bolts.

On the mast against the wall of the physical laboratory there is a pulley enabling us to lower the antenna at will.

The antenna consists of three wires of phosphated bronze, the sections being separated by pieces of tarred pine one metre in length. Since each

section is 45 metres long, the total length of our antenna is 135 metres, enabling us to hear the principal signals sent out from the foreign stations, French, German, English, etc. The extremities of the antenna are insulated by paraffined cords. The three wires are interconnected by a fourth wire, situated one metre from the pine; to this are connected two other conductors having a Y shape, and communicating with the main insulated cable which leads to the apparatus. The apparatus is in the laboratory upon a stand made by us in the carpenter's shop. Beside it is a desk, also of our own construction, where we can write down the messages transmitted. Our joints were at first made with ordinary lead, but as we have learned that there are other systems giving better results, we intend to remake the joints after the holidays. The wire is 'earthed' by attachment to one of the water-pipes, and is not insulated; but since this might be dangerous in a storm, we are going to replace it by a special cable.

The installation took a great deal of time. We spent quite a number of afternoons and evenings over the work. Great was our delight when, everything being ready, we heard the first 'crr . . . crr . . .' from the Eiffel Tower. Here was a man more than 150 miles away, seated in his office, moving a little lever, and about a thousandth of a second later a sound reached our ears. It was wonderful!

We think of subscribing to a wireless telegraphy review which will keep us in touch with all the new modifications made in this recent invention, one in which we are greatly interested.

(c) *Individual Practical Work.*—Out of class the pupil undertakes individual practical work upon physical and chemical questions in which he is specially interested.

(d) *Free Use of Apparatus, etc.*—Work in class as performed at Bierges, and free individual study, imply that the student should have free use of the apparatus, materials, and tools with which our laboratories, studios, and workshops are equipped. Thus the pupil has a real responsibility for all these things, a responsibility which educates his attention and cultivates his patience, so that he is taught, not the mere technique of manipulative work, not simply to find his own way out of difficulties, but also to guard against mishap.

(e) *Manual Work, the Making of Apparatus, etc.* —There is a constant association between our craft training and the study of physics and chemistry. The pupils make many of the instruments that are indispensable in their researches. It would take too long to enumerate everything they have constructed, but I may mention: levers, pulleys, apparatus to demonstrate the laws of falling bodies and the parallelogram of forces, inclined planes, Atwood's machine, presses, pumps, barometers, hygrometers, steam-engines, condensers, model aeroplanes, levels, thermopiles, telephones, telegraphic apparatus, pendulums, batteries, etc., etc.

But while making these simpler kinds of apparatus for themselves, they learn in addition how to manip-

ulate the instruments of precision with which the laboratories are equipped. I have previously referred to the twofold importance of the use of such instruments, importance at once scientific and moral.

In the first place, comparing these more elaborate instruments with those he is able to make for himself, the student learns how great is the progress that has been effected by modern scientific technique. Further, the mind of youth, inclined toward vacillation, hesitation, and doubt, acquires experimental certitudes which can never be furnished by inefficient instruments.

Furthermore, the pupils become accustomed to work with rigorous precision, to understand the importance of strictly scientific method. Let me mention, in this connexion, that we attach great importance to quantitative experiments, to experiments whose results have to be stated in precise numerical terms.

(f) *Acquirement of the Spirit and of the Practice of Scientific Method.*—It is not the aim of our system of instruction to bring about the accumulation of a store of memorized facts, but to enable the pupil to understand the spirit of the scientific method, the spirit of investigation and verification.

We derive scientific ideas from matters of everyday experience, familiar data, current facts.

With the aid of the observations and experiments and by the application of the methods previously described, we proceed from the concrete to the

abstract, from the particular to the general. We lead the student to deduce for himself, from the totality of the phenomena which offer themselves to observation and of those which are brought about by the work of his own hands, conclusions leading up to the formulation of laws. In other words, we enable him to secure a synthetic outlook, to discern the great frescoes of general ideas.

From physics and chemistry, studied from the first, not simply for their own sake, but as primary elements of knowledge, and above all with an eye to their practical applications, the pupils pass by degrees, through increasingly regular, precise, and definite co-ordinations, to the stage of classification when phenomena are studied in their widest bearings, under an autonomous scientific aspect, and in a systematic interlacement.

(g) *Practical Character of the Instruction. Glimpses into Industrial Life. Visits to Factories, Public Works, etc.*—To perform experiments, to undertake individual researches, to construct apparatus for physical and chemical study, to provide the means requisite for the rediscovery of a natural law—all these things are, in truth, varieties of laboratory work, and of primary importance.

In addition, however, it is essential that the pupil should secure a direct view of industrial life, visiting factories and public works in order to grasp the practical aim of his studies, his efforts, his scientific

investigations. Even though instruction be based upon the current applications of physics and chemistry, upon the phenomena and ideas underlying industrial processes, such excursions as I suggest will give the student a better understanding of the rationale of his labours. He will come into direct contact, not merely with the technical and scientific elements of physics and chemistry in their diversified applications to manufacture, but also with the social element of the division and organization of labour.

Some further quotations from the school magazine may be permitted.

A THREE DAYS' EXCURSION DEVOTED TO THE STUDY OF HYDRAULICS

(1) TO LA LOUVIÈRE

Our excursions this term were to be devoted to the study of physics. We have just been learning about the hydraulic press, and to give us an interesting illustration of its practical use nothing better could be found than a visit to the hydraulic lifts of La Louvière.

On January 27th we took train to La Louvière, reaching the place at about half-past ten, and making our way to the Central Canal. This is to connect branches of the Charleroi-Brussels Canal with the Mons-Condé Canal. The Parliamentary Bill introduced in 1877 declares: "It will enable a better use to be made of the varied products of the

Belgian coal basins, and will promote the interests of numerous Belgian manufactures."

As an engineer has said, when this canal is finished an uninterrupted navigable channel between Condé and Liége will connect all the coaling basins of Belgium. Mons coal will be easily conveyed to Northern France, to Flanders, to the province of Liége, and to Holland.

When we had walked along the canal for a quarter of an hour and had taken some photographs, we visited lift No. 1, under the guidance of the foreman, who did his best to answer the questions with which we overwhelmed him. I give a summary of the information I collected in class, the night before, and on the spot.

The difference of level between the two navigable channels connected by the Central Canal is considerable, amounting to 295 feet. But this difference of level, in a canal no more than 13 miles in length, is not uniformly distributed, for it may be divided into two very distinct sections. In one of these sections, $4\frac{1}{2}$ miles long, the change of level is 230 feet, whereas in the second section, $8\frac{1}{2}$ miles long, the fall is only 65 feet.

Lift No. 1 is composed of two metal chambers working side by side, each carried by an iron piston 6 feet 6 inches in diameter, the piston descending into a press of 6 feet 10 inches in diameter. The inside measurements of the chambers are: length 150 feet and width 18 feet, the depth of the water in the ascending chamber being 94·4 inches, and in the descending chamber 107·2 inches. This difference of 12·8 inches in the depth of the water gives a weight of 79 tons. The surplus water is withdrawn

from the upper reach and emptied into the lower reach. The water is retained in the chambers and in the canal by a system of watertight doors.

These doors are worked by water stored at a pressure of 40 atmospheres, the pressure being maintained by a pump operated by powerful turbines, driven by a head of water whose height is 55 feet. The water for these turbines comes from the upper reach.

To sum up, the hydraulic lift is a gigantic balance, the two chambers constituting the platforms. A complete cycle of operations on the part of lift No. 1, including the time necessary for the entrance and exit of two boats, one for the ascent and the other for the descent, amounts to fifteen minutes, nearly three minutes of this time being occupied by the vertical movement of the chambers. The total cost of the lifts was approximately half a million francs.

We subsequently visited lifts Nos. 2, 3, and 4. These are still in course of construction and differ in some respects from No. 1, since experience showed that certain modifications were desirable. Lift No. 1 was finished in 1888, and its use will be inaugurated when the others, as well as the entire canal, are finished, probably in 1915.

(2) TO LA GILEPPE

On the second day of our excursion we visited the dam of La Gileppe. We took the train as far as Dolhain, and walked thence to the dam.

Every one knows how and why this dam was

made, and I shall therefore be content to recall a few details. Formerly the manufactures of Verviers, when various processes in the production of wool were in question, had to get on with the water of the Vesdre, inferior in quality, extremely hard, and often impure and insufficient in quantity. The water was unsatisfactory for cleansing and dyeing.

To remedy this unfortunate state of affairs it was proposed to build a dam across the valley of the Gileppe, thus constructing a huge reservoir. The dam was to be made as strong as possible. Here are some of its dimensions.

It is 50 feet high, 46 feet thick at the summit, and 212 feet thick at the base. The width at the top is 900 feet and at the base 270 feet. It is slightly curved, the better to resist the pressure of the water. The total volume of the masonry is nine and a quarter million cubic feet, its estimated weight being 800,000 tons. To carry this quantity of material by rail there would be required 80,000 trucks each loaded with 10 tons, making up 2000 trains of 40 trucks each. If these trains were placed in series, they would extend for a distance of considerably over 300 miles, more than twice as far as it is from Arlon to Ostend!

In the centre of the dam, on a pedestal 25 feet high, is a sculpture of the Belgian lion, the figure being 50 feet high.

The reservoir behind the dam has a surface of 200 acres and a maximum capacity of two thousand seven hundred million gallons. The dam cost seven million francs to build. The first stone was laid in October 1869, and the colossal structure was completed seven years later.

(3) AT ZEEBRUGGE

At seven o'clock in the morning we entrained at the Gare du Nord. On reaching Heyst we inhaled with delight the bracing air of the coast. It was quite cold. Zeebrugge is a quarter of an hour's walk from Heyst, but we covered the distance in half the time, for we were eager to see the wonderful Zeebrugge Mole, unfortunately a useless structure.

In a preliminary study of the port of Zeebrugge we learned the following details.

During the Middle Ages Bruges was one of the principal seaports of the Continent, and was indeed spoken of as " the Venice of the North." It communicated with the North Sea by the Zwyn, an arm of the sea which gradually became silted up. Therewith disappeared the fame of the town, which became known as ' Bruges-la-Morte.'

King Leopold II conceived the idea of reviving the place. For this it was essential to secure direct access to the sea. At the same time, it would not suffice merely to prolong the Bruges canal as far as the sea, but it would be requisite, in addition, to construct on the Belgian sea coast a harbour suitable for the accommodation of large merchantmen. Bruges possessed no such port, and the work undertaken at Zeebrugge would have filled the gap had it not been for an error in the calculations of those who planned the enterprise. But this error, we are told by engineering specialists, rendering the realization of the design impossible, made the gigantic works practically useless.

A roadstead was constructed by building a mole surrounding three-fourths of the anchorage. The

length of this mole is over 8000 feet. It stretches out from the coast, turns eastward in a curve, and ends by running parallel with the coast.

The mole consists of three sections. The first of these, on the tidal shore, is continuous, and is 10 feet thick. Sheltered by this wall is an embankment 37 feet wide to carry a double railway track.

The second portion of the mole is broken by a gap over 800 feet in length, its object being to allow currents to circulate in the roadstead in order to prevent its silting up.

The third portion is continuous and consists of two parts. The first of these, 6700 feet in length, shelters a quay 250 feet wide, where vessels can make fast. The quay carries electric cranes, warehouses, etc., which are at present useless. The second part acts as breakwater and ends in a jetty-head bearing a lighthouse.

This huge structure cost thirty-eight million francs. It was made with the aid of a powerful electric crane, the Titan, which handled the cement blocks weighing 55 tons. The work took six years.

A TEN DAYS' EXCURSION DEVOTED TO PHYSICS AND CHEMISTRY, TO THE STUDY OF VARIOUS INDUSTRIES

During this excursion we visited the Cockerill factories (the Belgian Creusot), the electrical works of Charleroi, cement and lime kilns at Gaurain-Ramecroix, a sugar refinery at Chassart, glass works at Jumet, marble works at Merbes-le-Château, a factory for making glazed tiles at Hemixen, a

tannery at Stavelot, porphyry quarries, and slate quarries.

(1) *The Cockerill Works.*—The ore whence is derived the iron used in making machines, etc., is mined in Belgium and elsewhere. The coal used at the Cockerill works is Belgian. . . . The ores, loaded into trucks drawn by electric tractors, are tipped into the blast furnaces. Manganese and coke are used in the smelting. The blast furnaces, seven in number, are kept continually charged, hot air being forced into them by the blasts to increase the heat and thus to increase the yield of metal. These blasts are thirteen in number, six being worked by steam and seven by the waste gases from the blast furnaces. The slag is used for the manufacture of bricks (forty-five millions) and of cement (twenty thousand tons), known as slag bricks and slag cement. The growth of the Cockerill company has been favoured by the fact that the works were established in the neighbourhood of abundant deposits of coal, and although the mines have been vigorously worked for more than fifty years they are far from being exhausted. But the company buys coal from neighbouring mines in addition to using that from its own mines. The coke employed for the smelting is made in Semet-Solvay ovens. The gas given off during this operation is used to heat boilers, the steam from these being the motive power of steam-hammers and various other machinery used in the ironworks. A gas engine of 2000 horse-power drives the electric plant.

Next comes an enumeration of the principal mines in which the Cockerill company has a con-

trolling interest, and which will supply it with ores for a century to come.

Let us return to the iron. In the furnaces it becomes liquid and white as milk. It is drawn off every hour, and we were fortunate enough to witness one of these discharges. The fused metal runs into sand-moulds, emitting a dazzling light on its way. By a small carrier the pig-iron is subsequently conveyed to a converter in a neighbouring building, where it is transformed into steel by various processes, among others those of Bessemer and Martin. Thence it passes to the Pits furnace, where it is kept at an even temperature until it is sent to the rolling-mills. For this purpose it is lifted by a huge crane, and the fiery mass is delivered to the rolling-mill. Its fate is sealed; it has to be crushed, flattened out, and tortured in various ways. The block is now lowered to the ground, and thereupon two levers known as 'rippers' emerge from the ground and push it into the grasp of iron rollers which crush it ruthlessly, without an instant's hesitation. The operation is repeated again and again, the mass of steel becoming more and more elongated, until it resembles a fiery serpent. At length, when these terrible jaws have done with it, there is left but a slender ribbon. Not all the steel passes thus through the mills, for some goes direct to the steam-hammer and some to the hydraulic press. At the furnaces it is loaded on to electric carriers, by which it is delivered to the anvil of the steam-hammer, where the ingots are forged, flattened, and shaped as desired. We saw a great pillar of red-hot iron nearly 50 feet long and more than 3 feet thick; it

was the main shaft of a steamboat. So hot was it that we, standing twenty yards away, were forced to shade our eyes. When large masses of steel have to be treated in the forge several times, they are reheated in special furnaces. The hydraulic press kneads gigantic masses of incandescent metal without either noise or shock. This is why the press has certain advantages over the steam-hammer, for the latter shakes the whole building in which it works, and frequently disintegrates the homogeneous texture of the steel. There are three presses of 2000 tons each, two of which are used for the making of big guns and the third for the shaping of conning-towers, casemates, etc.

After forging, everything is sent to a workroom where it is finished off to the exact size. There is a tremendous din in this building, for here are at work drills, planes, band-saws, rotating disks, etc. All these machines are driven by electric power. Some finish off the various rounded articles, such as big guns, polishing them both within and without.

We visited the shop in which turbines and other engines are put together. There is a separate building where locomotives are assembled. The Cockerill company supplies these to many different countries. There is yet another building devoted to the manufacture of quick-firing guns. . . .

(2) *Visit to a Tile Factory at Hemixen.*—On reaching Hemixen we asked our way, and soon saw in the distance the impressive assemblage of factory chimneys and huge buildings. We walked fast, being eager to satisfy our curiosity. Already we could hear all kinds of noises: the whistling of small

locomotives, the blowing off of steam, the hum of machinery.

. . . Our guide took us first to the sheds to which the various raw materials are brought by rail: kaolin, a pure, white, and friable clay; sand; felspar. These materials are mixed in suitable proportions, milled, and then washed in great tubs. There results a paste of a homogeneous consistency and of the colour of cream; this is passed through filter-presses, and emerges in the form of rounded cakes. After being dried in special chambers, the cakes are recrushed to constitute a very fine powder. The powder is then compressed into slabs of various shapes, or into small bars cut by machinery into little pieces used in mosaic work. The blocks are now stacked in boxes of fire-clay, the boxes being placed in a furnace and submitted for some hours to a temperature of 1000° C. As soon as they have cooled, the tiles are ready for the decorative processes. Some of them are conveyed upon an endless band beneath a cylinder, where they are coated with an enamel from which the water is immediately absorbed. The solid constituent of the enamel is left on the surface of the tile, to melt when the tile is reheated and to cover it with a thin layer of glaze. The enamel is of various colours and can be applied to tiles stamped with designs in relief. The tiles, after they have been refired, are sorted and packed ready for transport. . . .

(3) *Visit to the Marble Works at Merbes-le-Château.* —Our guide took us first to the yard where the different blocks of marble are stored: white Italian marble, red marble, violet Norwegian marble, etc., etc. We visited also the sheds for the storage of

marbles liable to be unfavourably affected by heat and cold; for example, a particular black Belgian marble.

Next we spent a good deal of time at the electric power station, perfecting our ideas on electrical matters, a subject we have studied at considerable length during the last two terms. The Cockerill works and the Charleroi electrical works, above all, taught us a great deal about electricity.

We followed our guide across the sawing-room, in which numerous machines were working simultaneously. We learned how the great blocks we had just seen are cut into slabs of varying thickness. The large horizontal framework of each machine is provided with five, ten, fifteen, or even a greater number of blades, and this framework can be moved backward and forward, from side to side, or up and down. We had imagined that the marble was sawn by the steel blade, but we found that the cutting is really effected by the rough sand with which the saw-cut is kept supplied. By this method a cut two-fifths of an inch deep is made per hour. It does not seem very much. Of late years carborundum, a preparation of silicon carbide, has been used in marble works in the form of circular saws. By these saws marble can be cut into slabs far more expeditiously. For example, let us suppose that a saw-cut has to be made in marble to a depth of $1\frac{1}{5}$ inches, the cut being 6 feet 6 inches long. By the old method this would take three hours, but by the new it can be done in about ten minutes. At the marble works of Merbes-le-Château there have recently been invented and brought to perfection machines worked by electricity and using carborundum saws.

In other rooms the marble is sculptured with a

graving tool, with compressed air, or by hand. Chimney-pieces, staircases, etc., are manufactured. It is curious to note how the younger workmen have no difficulty about the prompt adoption of machine methods, whereas the older ones proved unwilling to change their habits, so that a whole room was filled with elderly hands working slowly and laboriously as they stooped over their benches.

After being cut, the marble slabs have to be polished. They are secured to the metal bed of a machine which has a vertical shaft turning a large plate of steel grooved on the under surface. This plate polishes the marble with the aid of sand and powdered stone. The surface to be polished is first of all scoured with coarse sand introduced between the polishing disk and the marble. Next, any small holes which may appear on the surface of the plate are plugged with a cement of peculiar composition. A final polish is given by the rotating disk, with the intermediation of powdered stone.

After visiting these marble works, the largest in Belgium, we took train to Jumet to see the glass works there.

I have quoted enough. These examples should suffice to show how valuable are such excursions for the scientific, technical, and social education of the pupils.

III. Mathematics

We apply the same methods to mathematical instruction. We were able to ascertain that children have a keen interest in these branches of

study, which appear so forbidding at the first glance, but which fulfil such eminently human desires: the love of investigating the unknown; the delight in action and in discovery; and the possibility of vividly realizing results, of materializing the discovered datum.

(a) *Observation and Experiment.* — In mathemathics no less than in natural science the processes of observation and experiment can be applied to the acquirement of elementary ideas, the ideas, in this instance, of extension, size, and movement. We have recourse to the outer world, to the world of concrete reality, in order to confer upon the child's mind a practical understanding of arithmetical, geometrical, and algebraical notions.

(b) *Initiation into Mathematics. No Abstract Definitions, no Calculation for its own Sake. Manual Work.*—In order that the instruction may be vivid and easy to understand, we avoid starting with abstract definitions and confusing rules which the student will gradually discover for himself as he manipulates the objects whence he derives mathematical data. Moreover, we select as such objects things that belong to the concrete environment. We avoid setting sums which are done for their own sake; we do not look upon number as an end in itself, but as a means for the expression of ideas, the definite representation of sensations, the reproduction of the qualities of outward objects. Mathematics is thus associated with other branches of

instruction. The child has unending opportunity to make use of numerical data, and by frequent applications he gains a thorough and efficient grasp of the utility of this group of ideas. Thus calculations are made about all sorts of things directly concerning the child's own life, the life of the school.

(c) *Geometry and Algebra.*—Initiation into geometry and algebra is begun at a very early age, the study of the latter branch being associated with that of arithmetic. By an inductive, obvious, and concrete instruction, we give the child a perfect understanding alike of geometrical theorems and of algebraical expressions. Laisant and Méray have well shown how these branches can be rendered intelligible and palpable. Inspired by their work, we have verified their ideas in practice.[1]

(d) *Manual Work.*—Manual work is an invaluable instrument for the initiation into mathematics and for the progressive enlargement of the circle of mathematical knowledge. Cutting out, cardboard work, and gardening, give vivid and frequent opportunities for the practical application of arithmetical notions, of the metric system, and of geometry. All this is peculiarly interesting to

[1] In this connexion I may refer to the ingenious English method of 'curves' (combinations of coloured wools stretched over surfaces, or in space within cardboard boxes) used at Bedales, in England, and described by Madame Truan-Borsche, who taught and developed it.

the pupil, for it is while acting that he counts, weighs, measures, and learns geometry. Consider what was said, *à propos* of manual work, on pp. 49–52, as illustrative of practical training in the use of numerical and geometrical data.

(e) *Graphs and Drawings.*—We make extensive use of graphs and of drawing to habituate the pupils to give concrete expression to mathematical ideas and to enable them to grasp the relationships between geometry, algebra, and arithmetic. For example may be mentioned graphic records of the growth, the weight, the dynamometric and spirometric force of each pupil; graphic records of gas consumption; graphic statements concerning various supplies, etc.

(f) *Orders Office. Workshop Accounts. The Co-operative Society.*—The pupils have organized an orders office. Month by month one of their number is responsible for the purchase of materials used in class work, such as paper, pencils, india-rubber, manuscript books, pens, pen-holders, blotting-paper, etc. For the workshops and studios, too, numerous purchases have to be made. The business relationships of the co-operative society are extensive. All these affairs involve the spontaneous entry into social relationships wherein the pupil 'lives' his arithmetic and comes to grasp its value to the individual and to the collectivity. A knowledge of the price of goods, the problems of interest, discount, etc., the keeping of accounts and the

posting of books, the numberless financial operations involved in the actual life of these groupings, combine to furnish arithmetical operations with positive significance and supreme interest.

(g) *Higher Mathematics.* — The mathematical knowledge which the pupils acquire by the methods which have been detailed is precise, firm, and clear, and thus affords a valuable introduction to the study of higher mathematics. It is comparatively easy for the adolescent to continue to assimilate mathematical ideas without being repelled by their rigorous logicality, or by their systematic concatenation of reasonings, formal calculations, and abstractions. But for this purpose we must wait patiently until the pupil's intellectual maturity permits him to interconnect logical ideas, to grasp their interplay, to become interested in the disinterested labours of the pure reason and in the inward contemplation of the developments of a train of mathematical reasoning. All this comes with time and patience. Mathematical study, associated at the outset with concrete life by means that are practical and easily comprehensible to the child, taught in a manner which does not ignore the natural development of the faculty of attention and the power of reasoning, leads in the end with all the more certainty and clarity to the understanding of abstract truths.

IV. Languages

1. THE NATIVE LANGUAGE

In the study of the mother tongue we apply the same methods of observation, experiment, and individual work as elsewhere.

(a) *Elocution*

Speaking is no less necessary than writing. During the first stages of scholastic life the ideas, feelings, and thoughts of the child are expressed orally. The spoken word plays a very important *rôle* beside drawing and other manual work. It is a natural means of expression, of which we avail ourselves, not only in other branches of study, but in the study of the mother tongue as well. Children love to talk. We teach them to talk well and to express themselves clearly, learning how to articulate plainly and to pronounce correctly, but also how to give their thoughts easy and fine expression. To form the taste, to improve verbal expression, we have recourse to methods which become amplified and increasingly complex as the pupil grows in years and knowledge. Choice of words and careful enunciation are excellent means for the cultivation of the mother tongue, and from the first we lay much stress upon both. We make speech an instrument of action. Let me explain to you some of our regular procedures.

(1) First of all come oral descriptions and narrations, given freely and spontaneously, relating to the facts and events of the individual life, scholastic life, social life, of the child; reports of what has been read or heard, tales or anecdotes, news, scientific expositions, etc.

(2) Lectures are given in class or before the school, in the presence of relatives and friends, relating to school work, experiments, excursions, etc. The object of this, as one of the pupils explains in the school magazine, is " to accustom us to public speaking, which is extremely difficult for nervous and timid persons."

(3) Dialogues between two or three pupils who represent characters in fables or stories.

(4) Set discussions in class.

(5) *Drama.*- " The juniors," we read in the school magazine, " have organized and installed a little theatre, and have already played several pieces with considerable success." This year the pupils were to perform a long play, Maeterlinck's *The Blue Bird*, and a number of shorter ones. Another excellent supplementary means for language study, especially in the case of the senior pupils, is to attend classical and literary *matinées* at the Brussels theatre.

(6) Poetical recitations and the reading aloud of prose selections.

(b) *Reading*

This may be considered under the following heads:

(1) *Readings to the Pupils.*—Children are very fond of being read to and of listening to story-telling. Many would rather be read to than read for themselves, feeling that the reader's voice and gesture make the action more vivid. In order to develop this taste we have a story-telling hour in the afternoon for the juniors, and evening readings for the seniors.

(2) *Reading in Class.*—Here the readings refer to the subjects of current instruction, and in respect of linguistic study, in particular, they take the form of explanations and commentaries suited to the pupils' age and acquirements, bearing upon the study of grammar, composition, literature, etc.

(3) *The Choice of Books.*—This is a difficult problem. There are not many books whose qualities definitely correspond to the ends we have in view, but such are not entirely lacking. Besides classical and modern writers, native and foreign, there are books written expressly for young people: stories, legends, novels, books of travel, works of science, etc. We make no use of anthologies, preferring extracts or complete works suited to our aims and of interest to the pupil. I mention haphazard the following names: Jules Verne, Mayne Reid,

Fenimore Cooper, De Amicis, Fabre, Moreux, Kipling, H. G. Wells, Tolstoy, Daudet, Theuriet, Blondiau, Shakespeare, Victor Hugo, Demolder, Maeterlinck, Maspero, Giraud, Maindron, Michelet, J. Renard, Butts, Charcot, de Gerlache, Walter Savage Landor, etc. We read also biographies of great men. We have books of all kinds, suited to all ages and all tastes.

(4) *Literature and the History of Literature.*—Literature is studied in the originals; and literary history, freed from pedantry and from fusty erudition, is brought into relationship with history in general. A work of art is an organ of the environment and an organ of its creator—hence the interest of vivid biographies. From time to time we devote our evening readings to the study and discussion of some notable work by one of the leading figures in foreign literature, ancient or modern: Cervantes, Shakespeare, Dante, Ibsen, Tolstoy, Emerson, Kipling, etc.

(c) *Composition*

One of the pupils contributed to the school magazine an article entitled "Teaching Composition." It expounds our principles. At his age (he is seventeen) it is already possible to offer independent opinions upon such topics. Having studied French in an '*athénée*' (Belgian public school), his experience enables him to compare the system practised

at Bierges with that adopted in official educational institutions. He writes as follows:

Composition is one of the leading subdivisions in the study of the French language. Not only does it cultivate our faculty for literary appreciation, but in many cases it is of essential value in daily life. Unfortunately its study is often neglected, and if taught at all it is apt to be taught very badly.

Let us first ask ourselves whether it is logical to speak of 'teaching' composition. Ought a child of seven or eight to be 'taught' composition? It is a natural vehicle for the expression of thought, for the putting together of ideas, for the narration of a fact, for description or exposition. In comparatively young children this can only take the form of recapitulations and descriptions of what they have seen, of individual opinions and reflections. To recount what one has seen or felt, it is needless, in my view, that one's expressions should be cast in a form rigidly limited by arbitrary and artificial rules. Why should we compel a child to think, to see, and to express itself, through the intermediation of others' thoughts, upon subjects which do not interest it, and where its personal initiative can find no vent? In compositions set for examination, those that have previously been learned by rote will be reproduced almost word for word, and the more literally they are reproduced the higher will be the marks scored.

How, then, can we expect that a child will take pleasure in these tasks which are eternally the same?

It should rather be our aim to render instruction in the mother tongue as natural and pleasant as possible. This is by no means difficult. It would suffice to choose subjects which interest the child and which are within the scope of its powers, not alarming it with the idea that something very difficult has to be done, but allowing it to tell the story in its own fashion, and using its own words. The great thing is to avoid giving the pupil predigested food, or material upon which the work has already been done. If the better method were chosen, we should before long secure compositions quite free from stereotyped characteristics, and severally reflecting the aptitudes of the writers.

This young man has grasped the principles by which the teaching of composition ought to be guided, the principles we apply at Bierges.

First of all the subjects should be those which interest the child, and which he is competent to understand, subjects belonging to environing reality, matters of direct experience in individual or scholastic life, matters concerning the animals, human beings, plants and other things by which the writer is surrounded. The subject may be selected freely by the pupil, by the teacher in conjunction with the pupil, or by the teacher in conjunction with the class.

Secondly, we must leave the child free to retell in its own manner what it sees, does, and thinks. We must leave freedom for the manifestation of

initiative, for the display of individuality; we must neither ask for nor impose a literary style, for we shall then evoke compositions which are free from stereotyped characteristics and which honestly reflect the writer's tastes and aptitudes. I do not mean to imply that there will be no occasion in class to furnish practical indications, to give general directions. Regular discussion (jointly undertaken by the entire class) dealing with the subject of the composition, and the reading of passages from writers who have dealt with the same topic, will lead to criticisms, comparisons, and reflections. This is excellent practice, providing safeguards against future errors, and illuminating the road which has to be traversed.

I append a number of compositions published in the school magazine. They are not models of 'style,' but free and spontaneous writings. They breathe the child, with his individual characteristics, his turns of phrase, his way of understanding things, and of expressing what he feels and thinks.

(1) *Description of Animals, Plants, etc.*

BERGEOT

Bergeot is an old grey dog. He is watch-dog at the farm. When he hears anyone in the road he begins to bark. Every week one of the juniors tends him, and when his food is brought he jumps up at the bowl, but directly one says, "Lie down!"

Bergeot goes into his kennel and does not come out until the bowl is on the ground. For a long time Bergeot had to sleep in a doorway, like a beggar. But now he is rich and sleeps in a fine house which has been built for him in front of the farm. We are all very fond of Bergeot!

TOP

Top is a bitch from Groenendael. She is mine, has belonged to me since the summer holidays. She was quite small when she first came to the school, and she was so funny that we all burst out laughing at sight of her. What we saw was a large black ball, which jumped about, and which whined because the house was strange and because it was already dark. Now she is nearly a year old; she is shedding her coat; she is large and beautiful. She loves to play with us. When we throw a stick for her to retrieve, she rushes to it, but instead of retrieving it she runs away with it. We run after her, but she is so lively in her movements that we have much difficulty in catching her. We all have great fun with Top.

THE COCK

The cock is a bird belonging to the family of Gallinaceæ. It is the male of the hen tribe. The cock keeps company with the hens to fertilize their eggs. He is the master of the farmyard and his manners are rather like those of a father with his children. He is generally larger than the hens, and this helps him to keep up his position. His

plumage varies according to breed, being sometimes white, sometimes black, and sometimes of many colours. In the last case there are some specimens whose colours harmonize beautifully although so very varied. Perched on the top of the cock's head is a red comb which is sometimes very large. Thus the cock is the best-looking fellow in the fowl run, being perhaps decorated in this way to please his wives. He is celebrated for his crow. He calls the hens, gathers them round him, warns them of danger by a loud " Cock-a-doodle-doo! " He starts crowing very early in the morning and repeats the call from time to time during the day. As a rule he is gallant, at feeding time he summons those of his subjects who are late for the meal, and does not begin to peck until all have come. Should you unfortunately want to catch him, he draws himself up in a posture of defence, a trick of his whenever he is displeased. So well known is this characteristic that when people wish to speak of some one who gets into a rage they compare him to a cock. Besides, the cock is a national emblem, for the symbol of France is ' the Gallic cock.'

(2) *Accounts of Excursions and Journeys*

VISIT TO A COAL-MINE

One of the foremen took us to the machine-house to see the steam-engines. Next he took us to the lamp-room, containing hundreds of lamps. It is one man's business to take charge of these, and he cleans them and keeps them in order every day. Before going under ground we went for a walk

round, to see the locomotives and trucks; from time to time long trains laden with coal started off. After a quarter of an hour we came back and put on blue overalls and leather caps. When we had waited for a moment the cage came up. It is very low and narrow, so that you have to squat down and take up as little room as possible. Still, we all managed to crowd in, and in a few minutes were more than 1500 feet below the surface of the ground. Leaving the cage, we plunged into the main gallery, which is from 6 feet 6 inches to 8 feet in height and from 10 feet to 12 feet in width. Leading from it were smaller galleries and seams. We walked for some way along the main gallery, seeing there the ponies that draw the trucks. These beasts go into the mine when they are quite young, directly they are strong enough to work, and do not leave it unless they fall ill or until they die of old age or fatigue. At the end of the main gallery we entered a seam which was barely 2 feet thick, so that we had to slide on our backs and sometimes on our sides. In these narrow seams the miners' work is difficult. They look black and tired. After visiting other seams and passing through some more galleries we got back to the cage and were soon above ground again. We had a wash and a shower bath, redressed, and went away, having enjoyed our visit very much.

(3) *Reports of Lectures, Discussions, etc.*

ALEX'S LECTURE

This lecture was given on February 8th to a friendly audience of relatives. The subject Alex

had chosen, "The Evolution of Agricultural Implements," was familiar to him, for he practises agriculture. Nevertheless, the preparation of his lecture required a laborious collection of data, a work he was well able to undertake, and required also a careful arrangement of these data. The first part of his lecture dealt with "The Origin of Agricultural Machines." It described the way in which man discovered the primitive swing-plough, which imitates the paw of burrowing animals, such as moles, and dealt with the subsequent invention of the modern wheel-plough. Later, at the opening of the nineteenth century, when the population of the rural districts began to flock to the towns, there ensued a rapid improvement of all agricultural implements in order to make good the deficiency of labour. His account of these developments was followed by a profound study, in which Alex compared ploughs, sowing machines, reaping machines, and thrashing machines used to-day with those that were employed fifty years ago. In newer countries, and, above all, in the United States and Canada, animal traction has, during the last ten years, been largely replaced by motor traction, the cause of this change being likewise a dearth of manual labour. Two different types of machines are used: first of all those which, resembling the older ones in form, are drawn by heavy petrol motors; secondly, the newer types of apparatus in which the motor and the agricultural implement are combined in a single machine. It cannot be said that either of these two systems is predominant as yet, for both have rendered great service, realizing as they do extensive economies in respect of labour

both of men and beasts and in respect of time and money.

The lecture was a success, for it was not so technical as to lose general interest, and it was well delivered.

(4) *Explanations of Pictures, etc.*

A COUNTRY SCENE IN PORTUGAL

It is a fine day, and the peasant women are washing linen in the river, using little wooden frames in which to kneel at their task. They never go alone, for while at work they keep an eye on their sheep pasturing in the meadow. The clothes already washed are stretched out to dry on the grass. Houses can be seen in the distance. The sun blazes. The running water is saying "glug, glug, glug," while the linen as it is rubbed in the water murmurs "vv . . . vv . . . vv . . ." "Mary, have you finished your washing? Give it to me to put into the basket." In some places the stream is wider than in others. Birds are singing, flowers are growing and smell sweet. The women are reflected in the water. What a glorious day for washing! The clothes are dried and bleached in a trice.

Contrast with this description by a lad of nine the following by a writer ten years of age, who adds almost nothing from his own imagination to the plain facts of the picture post-card he is looking at.

MOUNTAINS IN WINTER

We see mountains in the distance, the Alps. The chalets and houses with turrets and small balconies from which to look at the panorama are covered with snow. The trees are leafless. The heavy clouds seem to say, "Bad weather!" It is cold and the sky is dark. Near one of the houses lies a pair of skis used in the mountains. The road is bordered by snow and by sad-looking pines.

(5) *Personal Sketches*

These are very difficult, and especially so for the younger children, seeing that psychological analysis is not within a child's competence. But the juniors, having heard that the seniors were writing descriptive sketches of themselves, wished to follow suit. The following was composed by "a little boy eight years old":

MY PORTRAIT

I am a little boy. I was eight years old three weeks ago. I have a fine train and I have broken the engine, for it was too weak to draw the carriages. I study animals, plants, and the world; I do arithmetic, reading, writing, cardboard work, and music. I go for very nice excursions. I am very fond of modelling and drawing, but I like drawing best. Once a week I go to Brussels for my teeth, because of a thing I have to wear in my mouth.

The following portrait is sketched by a boy somewhat older:

MY PORTRAIT

I am a little boy nine and a half years old. I have a little nose which gets flat when I read and when I eat. I also have little teeth which will become bigger by and by. I wear worsted stockings and hobnailed boots. I am not very clean and I am rather untidy. I shall try to be good and to work hard.

(6) *Accounts of Daily Life*

The junior pupils have their own magazine for the record of the matters in which they are specially interested. They write very simply. To the same category belongs the writing of letters home.

(7) *Ethical, Scientific, and Literary Subjects*

For the study and analysis of these it is essential that the pupil should have attained a degree of intellectual development enabling him to reason about general and abstract topics. He can then analyse and expound a sentiment, a proverb, an idea, an event real or fictitious, a symbol, a prose or poetical selection, a scientific or artistic essay, etc. I quote some titles from the school magazine: "The Seniors' Function at School," "A Little Study on Coffee," [1] "Social Life at School," "A Summer Day in Rural Portugal," "Life is to the Strong," etc.

[1] English in the original.

THE PLEASURES OF EARLY RISING

How delightful it is to rise early in summer! I say 'in summer,' for in winter it is rather difficult to leave one's warm bed to take a cold tub. But it is very different in summer. We never seem to wake early enough. I generally wake at five, and hardly have I shaken off my lethargy when Alex comes to tell me in the sacramental formula, "It is time to get up." I rise, put on my slippers, pick up my clothes, and go down to the bathroom. Having washed and had a cold shower bath, I rub myself down vigorously, dress, and take a run in the garden to quicken up my circulation and promote reaction. In the garden one is filled with a sense of well-being and joy. The dewy air of early morning is fragrant with the scent of a thousand plants. The sky is limpid. On the horizon is gradually ascending the great golden disk, returning to nourish with its beneficent rays the entire animal and vegetable kingdom. In the air and flitting among the trees and bushes are swallows, robins, titmice, and sparrows. They pipe joyful greetings. It is in this beautiful natural environment that we set ourselves to work, a little reluctantly, perhaps, for we would much rather go for a walk. Still, it is for the sake of physical culture that we labour in the garden. As one of the pupils has well expressed it in "Life is to the Strong," a formal essay: "We must above all cultivate our physique in order to grow strong, seeing that none but the strong succeed." [1] No-

[1] I need hardly say that the thought here voiced does not, in its crude form, express the spirit of the school, nor even the

where but in the country can one enjoy the full pleasures of early rising, for in town the environment of nature is lacking. Still, the habit of early rising is a good one, for young people should not sleep too long, since this tends to make them soft and sluggish.

(8) *The School Magazine*

WHY DO WE PRINT A MAGAZINE?

As A. M. wrote in his introduction to the opening number, we print a magazine to accustom ourselves to the formulation of our ideas. Of course we can do this in our class compositions, but less adequately. It is well to state that we do not aim at showing ourselves off as infant prodigies. The articles in our little review are composed by the pupils and are *entirely individual.* We sign our articles so as to habituate ourselves to accepting responsibility for what we write. Further, in each case the writer's age is mentioned, not (as might be imagined) for display, but so that the readers of our magazine may take into account each writer's capacity and may note his progress. We speak chiefly of actual doings, describing how we learn, relating the principal events of the term, recording excursions, lectures, etc. It thus becomes possible to gain an

spirit of the pupil who composed the above-quoted essay. We teach, all the life at Bierges teaches, that the chief value of physical force is to constitute a precondition of nervous energy, the chief value of this in its turn being to constitute a precondition of spiritual strength—for by none but the spiritually strong is attainable a fine, rich, and fruitful life, a life of moral health.

idea of our activities and to keep track of the way in which these are gradually modified.

Only because the pupils' writings are free and individual, because these writings reflect the psychology of the authors, exhibit their 'style' (which is not literary, but simple, sincere, frank, and human), only because they give so full an idea of the school life, have I quoted largely from the school magazine. I am convinced that the best way of describing the essence of a school is to make the pupils undertake the description. Ours give a simple account of what they see, of what they know, and of what they desire.

(d) *Grammar*

Instruction in grammatical theory is intensely discouraging, owing to its mechanical and purely verbal character, and owing to its abuse of abstraction and classification. In its place we give a thoroughly live instruction, inspired by the following principles.

We deal with things rather than words. It is by observation, by the inductive method, that the pupil rediscovers the rules of grammar, which are treated as living phenomena in need of understanding and explanation.

This study is pursued whenever opportunity offers. We do not learn grammar for grammar's sake; we create a rule which is real and integral,

not isolated in a quintessential definition. Syntax and morphology are welded together in the simultaneous study of the form of the word, its sense, and its usage.

In the preparatory section we approach grammar by accident, as it were, during the study of elocution, reading, and composition, without laying stress upon it, but in a manner that leads to the inductive elucidation of certain elementary and fundamental principles.

In the general section we proceed to methodical study, which is pursued, however, by the methods of observation and experiment. There are no formal lists of names, and there is no rigid framework; we explain and expound an example, dealing with a text which has a complete signification and constitutes a living whole. At a later stage in the same section, grammatical study assumes a wider amplitude. Profounder comprehension is possible when a knowledge of other tongues enables the pupil to learn something of the history of languages and to make comparisons between the different forms of these.

(e) *Orthography*

Elocution, reading, and composition familiarize the pupil with the meaning, the form, and the sound of words, creating visual, auditory, and motor associations, and facilitating correct spelling.

If the pupil, notwithstanding these exercises carried on in connexion with every branch of study, should fail to spell as well as is usual at his age and with his degree of knowledge, he copies texts. This links up the motor and visual associations in a way which will ultimately get the better of orthographical difficulties. The matter chosen to be copied, in prose or verse, must, of course, be something in which the pupil takes a genuine interest.

2. FOREIGN LANGUAGES

The foreign languages taught at Bierges are German, English, Spanish, Italian, and Portuguese, the three latter being optional. Instruction is given under the following conditions:

(1) The study of a foreign language is not begun until the pupil possesses a good knowledge of his mother tongue, nor in any case until he is twelve years old.

(2) We employ the direct method, applied as follows:

(*a*) For two, three, or four terms the student is engaged in acquiring a concrete knowledge of the indispensable vocabulary, being bathed in an atmosphere by which he is, as it were, impregnated with the language. The best of all ways, it seems to me, is to stay in the foreign country for one or two terms, this being unquestionably preferable to the acquirement in class, by however excellent

a method, of the primary elements of the foreign vocabulary.

(*b*) When an extensive vocabulary has been mastered with the aid of much practice, both written and oral, but all vivid and concrete, the pupils pass to reading. During the first stage the study of grammar has been begun, pursued methodically, but always by the experimental method. Now the study of grammar becomes more fruitful. The practice of free composition is added to reading.

(*c*) In the last period translation is practised both ways, from the foreign tongue into the mother tongue, and conversely. The course is completed by essay-writing, and by readings from the more difficult authors, both being employed for the study of the literature, the art, and the social life of the foreign nation concerned—for our instruction aims not merely at imparting knowledge of the language, but also at making of the language an instrument for entering into and understanding the environment wherein it is spoken.

Our pupils begin the dead languages much later than is customary, Latin at thirteen or fourteen, and Greek at fifteen. They will now have attained a stage of intellectual development sufficiently advanced, and will have acquired a knowledge of the mother tongue sufficiently profound to enable them to study the dead languages more fruitfully and with less loss of time. The inductive methods

used in learning modern languages are, *mutatis mutandis*, applied also to the study of Latin and Greek.

V. Geography

In teaching geography and history we apply the same principles and have recourse to the same methods of scholastic activity, these being invariably based upon the pupil's individual work.

(a) *Introduction to the Study of Geography*

Young children are incompetent to grasp the ideas of space and time which underlie the sciences of geography and history. At the commencement of school life they lack even the idea of extension, or at least of great distance; and it is not until a comparatively advanced stage that geographical terms acquire for them any definite meaning. They must therefore be initiated by degrees, geography being presented to them in conditions under which they can assimilate it.

(b) *Natural Sciences*

These constitute one of the most valuable means for the child's introduction to geography. From the study of the beings and the things (men, animals, plants, and minerals) which compose his immediate environment, the pupil advances by natural gradations to the study of other environments and of

other kinds of life. Thus a comparison between the forms of our civilization (dwellings, furniture, clothing, food, agriculture, manufactures, commerce, etc.) and the modes of life of contemporary savages and extant lower races facilitates delightful explorations in all the countries of the world, explorations which initiate the child into an understanding of the interdependence of nature and man, and into a knowledge of the way in which each reacts on the other.

Zoology furnishes similar results. From the study of native ruminants we pass to the consideration of foreign and tropical ruminants. The lizard takes us to the Pyrenees, the chamois to the Alps, the dromedary to North Africa, the zebu to the East Indies, the yak to Tibet, the bison to North America, the llama to South America, etc.

In the study of plants, mineral specimens, and rocks we find further opportunities for taking our children on fascinating voyages round the world.

These geographical explorations, quite unsystematized, pursued merely as part of the study of natural science, exercise a suggestive influence, familiarizing the pupil with the idea of other beings, other surroundings.

(c) *The Immediate in Geography*

Obviously, then, we set out from the child's immediate surroundings, since it is to these that

observation and experiment can be applied in precise fashion and so as to furnish directly assimilable data. But this does not mean that we never go farther afield. To localize does not signify to isolate. I am well aware that there is sometimes a tendency to restrict the study of geography and history to the ' native land,' to confine this study throughout the period of primary instruction and education within a narrow, petty, nationalist circle. But from local facts we should pass to general phenomena, making the pupil grasp the extent and the interlacement of the data of immediate observation. We teach him to co-ordinate these, to compare them with analogous facts of a more striking character, facts at once more important and more impressive, which belong to a remoter environment beyond the familiar frontiers. We must quit the native circle and have recourse to explanations, descriptions, and comparisons that will elucidate geographical reality and render it more comprehensible. For example, we have enabled the child to see for himself the difference between the gentle flow of the navigable stream which meanders by the school and the rapid, almost torrential current of the non-navigable streams of the Ardennes; he has noticed the contrast between the wide and shallow valleys of Flanders and the narrow ' ris ' of the Walloon country. Why should we stop there? Must we not transcend the local and national outlook?

Should we not familiarize the child with more generalized phenomena? It would be preposterous to renounce the impressive and fascinating educational opportunities furnished by a description of such great rivers as the Nile, the Congo, the Amazon, the Mississippi, the Ganges, and the Rhine. Why should we not illustrate the formation of the narrow Walloon ravines by the stupendous example of the Colorado river, which since remote geological times has been hollowing out a gigantic fissure in the plateau across which it flows, making cañons with sheer walls sometimes attaining a height of nearly 7000 feet?

(d) *Interest and Enthusiasm*

Dry formulas and arid nomenclatures have no interest for the child. He has no use for this abstract geography, for dull strings of names; what interests his intelligence and arouses his enthusiasm is to discern the reciprocal reactions between living beings and nature, their respective efforts, struggles, harmonies, and successes. Geographical facts taken in isolation are dull. We must make them alive, and must never detach them from their environing conditions. What is a river, a mountain, a sea, a town, a country, or a people? They are nothing but labels, empty names, unless behind them the child can envisage life, movement, and emotional reality. It is essential that he should be able to feel what is in progress in these things,

that he should be given a sense of the active interplay in the relationships between nature and man. Narratives of journeys, made by real or imaginary travellers, furnish an admirable guide in all geographical explorations. The use of such narratives will be reconsidered presently.

The essential point is that the pupil should not remain passive, but should acquire a sympathetic understanding which will interest him in the life of the earth.

(e) *Integral Conceptions, Great Syntheses*

I have previously explained that at the outset geographical instruction takes the form merely of chance explorations, of intermittent study, undertaken as opportunity arises in connexion with the study of other natural sciences. In the second stage we effect co-ordinations, establish certain integral conceptions, lead up to syntheses possessing a self-sufficient life. From the study of physical geography and of human geography we derive the elements indispensable for the illumination of certain natural geographical aspects. Concentrating our attention upon this or that natural phenomenon, and upon this or that form of civilization, we devote special attention, now to the mountain, the table-land, or the plain; now to the nature of the soil, to the sea, to climate, and to the distribution of animal and vegetable life; now to contemporary savages, to primitive man, to agricultural

and industrial civilizations, to towns, mines, harbours, means of communication, etc. In organizing these geographical syntheses we call the other sciences to our aid, appealing to geology, zoology, botany, history, physics, chemistry, etc., not in order to establish mere superficial co-ordinations, but going to the root of the matter.

Casual explorations followed by synthetic co-ordinations of the leading aspects of nature and civilization, originating and cultivating a geographical sense, prepare the pupil by degrees for the systematized study of the geography of various countries from the physical, economic, political, and commercial outlook.

(f) *Auxiliary Methods*

(1) *Manual Work.*—Mapping and the construction of geographical models are of prime importance to co-ordinate the pupil's ideas, to render them precise, and to fix them. We have recourse to the cardboard workroom and to the carpenter's shop for the construction of various receptacles for collections of picture post cards, engravings, photographs, natural products, etc., and also for more ambitious purposes. I may mention as a typical example an apparatus constructed in cardboard and in wood for the verification of the hypothesis of Suess concerning the formation of terrestrial reliefs.

Gardening and agricultural work are turned to

great advantage in geographical training. While engaged in these labours we can make numerous and interesting observations and experiments upon the varying characteristics of soil and consequent variations in crops, upon the slope of the ground and its utilization, upon the way in which floral distribution is affected by soil, exposure, humidity, etc. Thus, physical geography, studied in the open, based upon geology, and continually brought into relationship with human geography, becomes a peculiarly vivid science.

(2) *Excursions.*—In our excursions, though these are, as a rule, primarily devoted to zoology, botany, physics, chemistry, etc., we never miss an opportunity of studying the geographical environment, our methods of instruction being peculiarly fitted to throw light upon geographical aspects and relationships.

Some excursions, however, are specially organized for geographical study. Thanks to the ease and cheapness of Belgian travel, we have been able to visit the entire country, studying from close at hand its natural regions, its inhabitants, and its manufactures. Geographical ideas acquired concretely and *in situ* are better assimilated and better remembered.

Some days before the outbreak of the war, the pupils returned from a ten days' excursion devoted to the study of the sea under the following aspects:

(*a*) Geographical and physical: saline ingredients,

waves, tides, currents; rain and wind; climate; nature of the soil of the coast, contour; sand, shingle, dunes, alluvia, etc., etc.

(*b*) Zoological and botanical: littoral fauna and flora, varying with the character of the coast.

(*c*) Sociological: population (physical characteristics, habits, etc.), grouping (dwellings, towns, etc.); agricultural life on the coast (polders, drainage, tillage, and pasturage, etc.); maritime life (fishermen and fisheries, fishing-boats, harbours and their equipment; commerce; lighthouses, life-saving apparatus; education, training-ships, etc.; fish-markets); the moving and tragical history of the incessant struggle carried on by the coast-dwellers against the hostility of land and water, a struggle in which Belgium, displaying heroic and invincible persistence, has at length gained the upper hand.

(3) *Reading.*—In the happiest fashion this supplements personal observation and experiment in physical and human geography. During the preliminary stages of exploration and elementary synthetic co-ordination, children are greatly fascinated by the travels of imaginary characters, such as the heroes of Jules Verne, Mayne Reid, and Selma Lagerlöf, and by those of real individuals like Vasco da Gama, Magellan, Christopher Columbus, Stanley, Savorgnan de Brazza, Cook, Nansen, and Sven Hedin. The doings of these travellers, the movement and the colour of their voyages, arouse the pupil's enthusiasm, stimulate his receptivity, and

breathe life for him into geographical details. Our more advanced scholars read and refer to monographs on the different countries of the world, relating to mineral resources, flora, fauna, manufactures, commerce, etc. When the school library proves inadequate for our needs, the New University of Brussels and the Geographical Institute attached to the university generously allow us the use of their libraries. Let me take this opportunity of reiterating my cordial thanks for the favour.

(4) *Collections. Geographical Museum.*—Our collections of pictures of all sorts, graphs, statistics, natural and economic products, etc., serve to illustrate our instruction, to render it more precise, more actual, and more complete. From every walk, every excursion, we return laden with materials for the gradual furnishing of a geographical museum.

(5) *Free Work. Geographical Society.*—As in other subjects, so also in geography, some of the students engage in independent research. I may quote in illustration the report in the school magazine of a lecture delivered at the school.

The series of lectures by pupils and teachers was inaugurated by our comrade, A. M., his chosen subject being the port of Antwerp. He visited Antwerp, to study matters at first hand, to verify what he had read, and to bring us back personal impressions. To a large audience the young lecturer began by recounting the history of the town of Antwerp, introducing the legend regarding the

origin of the name ' Antwerpen.' He went on to describe the city as it exists to-day. He took us for a walk along the Scheldt to show us the river and to give us a better understanding of the natural advantages of the harbour. In his company we visited the quays, with their gigantic cranes, the docks, the slips, and the warehouses, studying the dimensions of these and their busy activities. We were thus enabled to marvel at the powerful equipment of the great harbour. In conclusion, he made a detailed examination of the commerce of Antwerp, comparing it with the other great ports of the world: New York, Liverpool, London, Rotterdam, Hamburg, and Havre. Numerous diagrams, maps, statistical and graphical statements enabled us to form a precise idea of Antwerp.

When the war broke out a number of other studies had been completed, and yet others were in course of preparation, for lectures on Brazil, Canada, Argentina, Portugal, the great industrial regions of Belgium, Northern France, and Germany, the Belgian mercantile marine, etc.

At the suggestion of the Natural History Society a Geographical and Historical Society was founded by the junior pupils, to supplement the zoological and botanical monographs produced at the school, by monographs dealing with geographical and historical topics. Our little geographical society initiated a collective investigation into the geography of Bierges and neighbourhood, which was to be studied under various aspects, industrial,

agricultural, geological, sociological, etc. Each member of the society undertook a special branch, while all participated in the excursions organized for the collection of data. Visits to local industries had already been begun, and numerous observations had been recorded relating to geological, physical, meteorological, and agricultural phenomena, as well as to the lives of the workers. We had hoped this year to extend these researches far more widely.

VI. History

We apply the same methods in introducing the pupil to the study of history.

(a) *Natural Sciences*

At the outset of his scholastic career the child lacks the sense of duration, just as he lacks the sense of space. He is quite unable to grasp the meaning of historical development. Only by degrees can he acquire the idea that in other times things were different from now. For history, as for geography, the natural sciences furnish invaluable auxiliaries in this historical initiation. The study of men, animals, and plants suggests associations, turns attention toward the past, and leads to interesting explorations of bygone periods. The oxen peacefully grazing in front of the school, and the cat dozing indifferently by the stove, never suspected that, without asking their permission, and mounted

in imagination on their backs, we were travelling to distant lands and to remote epochs when they were worshipped. One day these travels may take us to ancient Egypt, another to some other land. It is not surprising, when we find ourselves in India riding on an elephant, that we should make our mount carry us back through the ages in order that, as bold explorers, we may pay homage to the strength and majesty of the mammoth.

I have spoken of animals, and I could refer also in this connexion to plants and stones. But obviously man is the centre of interest, the focus from which all our explorations radiate, the starting-point for the excursions we make through time. What we discuss are human activities, the way man satisfies his personal and social needs considered in their simplest, most general, and most essential aspects. We deal, in a word, with the way man lives and strives, in his attempts to gain mastery over nature, or when he obeys nature to conquer in the end.

(b) *The Starting-Point — Historical Actualities — Chronological Order or Working Backward — Synthetic Co-ordinations — Precise Systematizations*

Such historical explorations and journeys are chance ventures, suggested during the study of other branches. But as the child grows older he becomes competent to grasp the meaning of

historical development, he acquires a definite notion of time. Lectures and excursions come here to the aid of nature. We can now introduce the study of phenomena and of historical questions relating to the things and the forms of social life. Thus, by synthetic co-ordinations, we bring the concrete data of the pupil's experience into relationship with general questions of housing, clothing, transport, agriculture, manufacturing industry, and commerce (markets, money, etc.). We are concerned with the history of the means by which man satisfies his quintessential needs.

Thus, starting from the social realities of the child's environment, leading on to the consideration of analogous details in the lives of the extant lower races, and proceeding to the study of the life habits of our own primitive ancestors, we establish the idea of time upon a solid and objective foundation.

Our synthetic co-ordinations are based upon contemporary social facts, reduced to their simplest and most essential forms. From these, by a brusque transition, we pass to the earliest days of human history, travelling thenceforward in chronological order. Since it is obvious that the child's natural evolution is an epitomized and fragmentary reproduction of the phases through which mankind has passed, the phenomena of remote epochs are apt to be far more completely within its comprehension than the phenomena of our own day. A

clear understanding of the conditions of primitive life will therefore help the pupil to understand the present.

When these special synthetic co-ordinations have been established, and when these isolated aspects of history have been considered, we may turn to the study of more generalized synthetic co-ordinations, no longer grouping *things*, but *forces*. Around the figure of a man, of a hero, we shall reconstitute the material and spiritual life of an epoch.

When this stage has been passed our pupils will be competent to undertake the systematic study of history at once in its details and in its interlacements.

(c) *Interest and Emotion*

These constitute the motive forces in the teaching of history.

In the first place we ensure that the child shall never be a mere passive spectator in relation to the events of history. We call upon him to undertake individual effort to achieve the reconstitution of historical fact, putting at his disposal for this purpose, books, albums, collections, etc. In discussions which take place in class he is further invited to comment upon historical events, to elucidate their consequences; in a word, to adopt a moral outlook. He plays a part in the scenes, lives among living beings.

Secondly, in addition to holding classes in which

the plan of study is elaborated on the lines previously explained, we deal with history as a description and an explanation of the ascent of man, of his efforts, struggles, and progress, in the course of this evolution. Thus the biographies of great men, of all those who have incarnated or symbolized a scene or an epoch of historic life, are to us precious aids to the understanding of events. I need hardly say that we endeavour to place these heroes in their proper setting, to explain the social determinism through which they came into existence and through which they became the figures that we see. The individual and the environment are reciprocally generative of action and reaction, and in this interplay of forces lies the essence of evolution, of human progress. When such methods are adopted, history ceases to be the history commonly taught in schools, a dry and lifeless exposition, a precise catalogue of dates, names, dull and sterile facts.

(d) *Manual Work—Collections—Historical Museum —Excursions—Reading—Free Work — Lectures —Historical Society—Dramatic Representations —Monographs*

(1) *Manual Work. Collections. Historical Museum*

Drawing and modelling aid us in the representation of monuments, churches, dwellings, weapons, utensils, of everything that can recall, symbolize, and concrete the material and spiritual

energies of past times. In the cardboard work-room and in the carpenter's shop we prepare some of the materials for our collections and construct the cases in which these are housed when made. For with pictures and documents of various kinds, with fossils and the like, we have established what I may speak of as an embryo historical museum, assisting the pupil to form a vivid picture of the events of distant epochs. The exhibition we gave concerning the history of primitive times has already been described (p. 101). This year the Historical Society hoped to organize an exhibition dealing with the historical development of dwelling-places, clothing, and means of transport.

(2) *Excursions*

One of the best ways of encouraging a historic sense is to visit ancient monuments, antique dwellings, old streets, all the vestiges of the past. In these respects Belgium offers an astonishingly varied field of observation. Next door to a factory we can see a noted church or monument, a house celebrated in history. Many of our excursions are devoted to visiting Belgium, considered as a vast and living historical museum. In the towns, and in the public collections in these towns, we find everywhere means for making the past live again. Visiting Spy and Furfooz, impregnating ourselves in the local atmosphere of these places, examining their prehistoric caves and other notable relics, we

have been able to reconstruct in imagination the most remote epochs in human history. Our efforts in this direction have been supplemented, and gaps in our historical knowledge have been filled in, during visits to the Jubilee Museum and the Natural History Museum in Brussels.

(3) *Reading*

It is essential that the pupil should read and should have read to him matter which will amplify and elaborate his historical knowledge. Suitable works are those dealing with the history of products, manufacturing industry, instruments, science, and art (Bleunard, Figuier, d'Avenel, Pelloutier, Rambaud, Parmentier, Hoeffer, Reinach, Ménard, etc. etc.); biographies of great men dealing with real or imaginary figures (Rosny, Maspero, Buckley, Butts, Wallace, etc.); historical romances (Walter Scott, Chateaubriand, Mérimée, etc.); accounts of manners, customs, and institutions (Maspero, Ménard, Guiraud, Langlois, Maruéjol, Froissart, Lenôtre, Lacour-Gayet, etc.); general history (Duruy, Lavisse, Rambaud, Seignobos, etc.). Our young people also have at their disposal works of a more specialized character, enabling them to grasp the critical and investigatory methods employed by the great historians of all times and nationalities—the works of Plutarch, Taine, Pirenne, etc.

(4) *Free Work. Lectures. Historical Society. Dramatic Representations. Monographs*

Outside class the pupils study various historical branches chosen by themselves. In one instance the subject may be one relating to a historical epoch; in another it may concern the history of some particular place, such as the port of Antwerp; while yet another pupil may devote himself to the history of methods of tillage; and so on. Lectures are given upon the results of such researches. One pupil made a collection of pictures bearing upon the history of the means of transport. Among lectures given to the whole school by the teachers, two may be cited for special mention: a history of Belgian music, and a biography of the Belgian savant, Houzeau de Lehaye. Owing to more pressing claims upon our time, all that has been possible to the historical society is to formulate its programme, consisting of the following items: (*a*) the organization of excursions devoted to history; (*b*) the organization of dramatic representations of historical interest; (*c*) the preparation of a historical monograph on Bierges. Its activities this year would have been more extensive, and it would doubtless have fulfilled its mission with an ardour no less notable than that displayed by its elder sisters, the Natural History Society and the Geographical Society.

CHAPTER IV

MORAL, SOCIAL, AND ARTISTIC TRAINING

Material and Social Environment—Self-government, Social Duties—Liberty, Authority, Sanctions, Masters—Taste, Art, Music, Singing—Sexual Education and Co-education—Summary and Conclusion

PHYSICAL and mental education are no mere preludes to moral and social education; if the former be well directed they constitute for the latter the widest and most efficient preparation.

For physical and mental education do not aim solely at making the child a robust animal and at equipping his mind with all desirable knowledge; it is their function to endow him with virile qualities, with a spirit of initiative, independence, and personal responsibility; to lead him to become a man master of himself, a self-governor, and one whose heart vibrates in response to a sense of solidarity with his fellows. At Bierges, then, we have no concern with that didactic instruction in morals wherein the pedagogues of old delighted to excess. Did not William James declare that the theoretical teaching of morality has never taught men the art of good conduct? The ancients recog-

nized this truth, for they said that virtue cannot be inculcated by theoretical instruction. It is acquired by experience, by making personal use of freedom. It is not transmitted from without, but comes from within. We are led to a specific conception of the means suitable for ensuring moral education, to a new orientation of scholastic discipline.

Just as in physical and manual training and in mental education we appeal to the pupil's collaboration, to his initiative, his inquisitiveness, and his self-interest, so also in moral education we ask him to set out from his own experience, so that he may organize his moral life for himself, and by individual means and personal effort may realize the existence that will best conform to an ideal of goodness, truth, and beauty.

This implies that we should know and practise various methods which have now to be indicated.

I. Material and Social Environment

It is incontestable that one of the leading factors of the child's moral evolution is constituted by the organization, the type, the value, of the environment in which he has to live and to grow toward maturity. These questions of surroundings are of primary importance, and it is necessary to take great care that the environment shall respond, through its solicitations and other influences, to the mission which it is by nature called upon to fulfil.

The action of environment, be it direct or be it indirect, has a power which nothing can withstand, for it works continuously. If it be true that the moral life of the child should be the outcome of personal experience, should be the fruit of spontaneous adaptation to school life, to the social life passed with comrades and teachers, it is easy to understand the importance of properly organizing the physical and social milieu wherein the child has to live and grow.

This milieu is, however, extremely varied. Its aspects may be classed in two categories, the physical and the human, respectively. In the first chapter I referred to the importance of physical environment. One of the essentials of the educational success of a New School is a right choice of locality. Our school is in the country. The valley of the Dyle, which it overlooks, and the wooded hills by which it is surrounded, form for it a picturesque and beautiful frame. So calm, restful, and pleasant is its situation that, as I have said, everything about the place inclines toward ease of mind, good temper, peaceful labour, and the joy of life. These things exercise a precious influence upon the child, favourably affecting alike its physical and its moral development. The woods, the orchard, the park, the country-side, the rich, natural scenery, amid which the child lives, exercise a salutary, beneficent, and stimulating influence, an influence which is profound, unconscious, and unceasing.

The very fact that life is happy, calm, and satisfied leads the mind to strike deep roots into the peace and the beauty of the natural environment, whence it draws a nutritive sap.

The school is also the home. Like the natural environment, it is calm, restful, and favourable to ease of mind. There is nothing to recall the school of traditional type; above all, there is nothing to recall the school which resembles a barrack or a prison.

Fresh air, space, light, freedom amid nature, amid country scenes, amid trees and flowers, unquestionably furnish the best environmental conditions to guarantee that children shall enjoy, naturally and without effort, the vigour and the health which are the basis of all moral life; and these are the best things to inspire them with a taste for the beautiful. But while country life spontaneously exercises this salutary influence upon the child's heart and disposition, it is necessary to employ additional means aiming more directly at the formation of moral character.

First of all, do we not discern such means in games, sports, gymnastics, walks, excursions short or long? Are not these valuable auxiliaries to the child's social and moral education? They furnish excellent opportunities for the development of powers, moral as well as physical; they enable the child to discover itself, to grow hardy, to acquire discipline, self-discipline; they enable it to gain

courage, patience, and endurance; they encourage the practice of solidarity and mutual aid in an atmosphere of vigour, cheerfulness, and good temper.

Need I add anything to what was said in the first chapter concerning the great moral value of the various kinds of manual labour; concerning the numerous traits of steadfastness, patience, precision, truthfulness, and emulation which they develop in the child? I showed that manual work, to be regarded from one point of view as a means by which the child can express its ideas and satisfy its needs (in especial, its instinct for constructing, inventing, imagining, and creating), is from another point of view a powerful instrument of social education. At the forge, at the carpenter's bench, in agricultural labour, the child learns to join with others in a common work. It will be remembered how the pupils love to recall the joys and the difficulties of the tilling of the school grounds which they undertook in the conditions previously described.

Just as much as the different kinds of manual work, the methods of mental education aim at developing the child's moral powers, tending to induce the recognition that knowledge is the outcome of human endeavour, and valuable only through its moral implications in the widest sense of that term. The child which has been led to rediscover knowledge and technical competence by personal effort is in a position to understand how

much effort has been necessary generation after generation in order to bring humanity to the stage now reached. Such a child will realize how much steadfastness, patience, and enduring courage man has needed, how many lofty virtues he has required, to enable him to effect the gradual illumination of the darkness by which he is surrounded. The continuity of human struggle, the persistent love of truth which inspires scientific research—these things will have become real to the child. It will have learned, too, that in sharing the delights and difficulties of this upward evolution no country can take precedence of the others, for scientific endeavour is social endeavour, an endeavour in which the work of the individual and the work of society are happy complements, that it is, in a word, human endeavour. Each nation contributes its own share to the construction of the joint edifice.

The child will also have learned that all the sciences are an instrument of social development, inasmuch as their applications serve to ensure the advance of the collective life, to enhance the strength and the beauty of the collective life, and to enrich the moral and material life of the individual.

It is our constant care at Bierges to render instruction thoroughly educative. We seek to make the pupils understand that all science, while emanating from the physical, mental, and moral powers of the individual, and increasing these powers in return, emanates also from social collaboration, gives

expression to that collaboration, and increases the intelligence, the power, and the interest of social life.

Thus in ultimate analysis every object and every method of instruction is utilized in our school to make the child understand wherein consists the moral essence of social life, to make the child feel that the ideas it acquires, and also the scientific technique in whose utilization it gains facility, are functions of human solidarity. Mental work, no less than manual work, tends to develop the consciousness of a relationship with the social environment, and to instil an idea which, however simple, is of immeasurable scope—namely, that the individual's effort is not purely individual, but invariably has social reactions. In other words, the child learns that the facts and the doings of private life are also functions of social life. We attempt to give the pupil the feeling that while he is subject to the influences of the social environment, he, in turn, acts upon this environment; that he can modify the environment for good or for ill, and that all his work, while redounding to his individual profit, has an echo in the collective life of the school.

Everything at Bierges, lessons, classes, manual labour, field work, contributes toward developing, strengthening, increasing, in the child, not only the consciousness of its own individuality, not only the recognition of itself as a self-assertive agent, but in addition and no less the social sense, the consciousness of the collective life.

In the preceding chapters I have given numerous examples of our attempts in this direction, and need merely refer to them in passing. But from amid the assemblage of facts which have combined to make up our school life I should like to select a single concrete example which will enable me to explain myself in more definite terms.

There is a pond at the school, where the children bathe when the weather is warm enough. Since it is fairly large, we use it as a swimming bath, and its transformation to fit it for this function was effected under conditions which are worth relating at some length, in view of the light the matter throws upon our methods.

Some of the children who bathed in the pond complained that the water was very dirty and that there was a great deal of slime. Since its size rendered it suitable for a swimming bath, it seemed to them that it would be worth while to clean it out.

How could this be done? What were the best means to employ? There were problems to solve and difficulties to overcome. There was knowledge to acquire, and there were studies to be made. All this seemed very interesting to the pupils.

The first step was to convene the general assembly of the pupils in order to make the matter known, and naturally all were delighted at the idea. A committee was appointed to approach me on the subject. I approved the suggestion, and advised the pupils to set to work by collecting all the in-

formation and reviewing all the facilities they would require, so that they might draw up a plan of work, might provide a methodical exposition of the problem and of the means available for its solution.

The pupils' assembly having been again called, notice was given of my approval, and the matter was talked over once more.

The committee, having marshalled its ideas and collected all kinds of information, drew up a report for presentation to me. Having carefully examined it, I met the committee, and after an exchange of views and a discussion we modified certain points, amplified others, and were able to formulate a plan of campaign.

The first step was to empty the pond, a complex problem. This was a matter for physical science. What are the means suggested by that science for such an operation? Obviously the experience of our teacher of physics would help us here. And you may imagine he was not slow to avail himself of this opportunity to suggest the study of a particular department of physics, that known as hydraulics. Was not the occasion propitious? Science exists to subserve social needs, and could there be a better way of making a child understand its usefulness, its social bearing, and also the way in which it may prove profitable to the individual?

The physical problem required close examination. First of all it was necessary to divert the stream which fed the pond, for otherwise our trouble

would have been the reverse of that which afflicted the Danaides, who were compelled everlastingly to pour water into a sieve. This part of the work was cleverly carried out by the children, now become real engineers. Have not grown folk found it necessary in the past to change the course of rivers?

Now the emptying of the pond could be undertaken. A troublesome operation this, requiring patience, great inventiveness, and numerous researches. After a study of scientific principles we had to discover the precise application of these to the given case. A thoroughly able and well-informed teacher of physics, like our own, could not fail to turn these researches and endeavours to great advantage, guiding his pupils in the arts of discovery, observation, and comparison. After various methods had been tried, siphonage and others, some one proposed that we should use a Dutch scoop, and this apparatus was made at the carpenter's bench. It was tried, and the results were entirely satisfactory. In the present case it was the only appliance which could serve our turn.

The happy thought emanated from a youth who had never had any intention of becoming an engineer, whereas, and this is the amusing point, one of the others looked forward to being an engineer. He and his parents were absolutely set on the idea. Our own impression had been that the suggested future was an unsuitable one. He did

his best, worked very hard, made investigations and practical attempts, but none of his proposals were of any use. For, let me repeat, the essential is, not the knowledge of a great many things, but the knowledge how to apply things, to set them to work. In the case with which we are now dealing the fruitful idea was furnished by one who, apart from all question of specialization, best represented the spirit of the school. Does not this prove once more that creation is not the work of specialists alone, and that routine and automatism may sometimes hinder invention?

Our pond had been emptied by the Dutch scoop, and we now had to clean it. How was the enormous quantity of slime and mud to be removed? Several methods were essayed. We even tried a sort of dredger, carried upon a cable slung above the pond and worked by a system of pulleys. It was no good. We were forced to have recourse to the most primitive, the most rudimentary procedure. We shovelled out the mud and carried it away in wheelbarrows. The work required plenty of patience; it was ardous, tedious, and extremely dirty; but since it had to be done, we all put our backs into it.

The mud was cleared away. It was impossible to pave and cement the bed, for this would have been too costly. But I need hardly say that very complete estimates were drawn up. The pupils consulted firms supplying building materials,

visited experts and listened to what these had to say—just as they had gone to Brussels to consult a lawyer before founding their agricultural co-operative.

In view of the high price of concrete, and awaiting a more favourable opportunity which we anticipated would come shortly, we contented ourselves for the nonce with covering the bed with sand. This was also obtained by the children.

Now came the time when the pond was to be refilled. Its cubic capacity had been calculated, the yield of the stream had been measured, and a comparison of the figures showed that unfortunately the pond would not be filled in time for the festival of the birds and the trees. General had been the desire to inaugurate the swimming bath on that day. What was to be done? How difficult a problem! The children must rack their brains. Having done so, after a few days a solution occurred to them. A number of wooden gutters, made in the carpenter's shop and fitted by means of pipes to the water-taps of the house, would enable them to use the communal water supply to fill the swimming-bath. The idea was simple, but search was required to find it. The wooden gutters were prepared, and so were the pipes to feed these from the taps. The pupils were delighted that their difficulties were at an end and that everything was in place ready for use. Suddenly, however, work had to be suspended, for a meeting was convened, the

committee announcing that I had found myself compelled to object for reasons which I desired to explain.

What had I to say to them at the meeting?

"It's all quite simple, my friends. You have overlooked that the water you wish to use belongs to the commune, and that you cannot dispose of it without asking permission. I have little doubt that the commune will authorize you to use the large quantity of water you need, but still, you must ask. This is the month of June, and the weather is already very sultry. You cannot be certain whether you may not be doing injury to others, whether you may not be depriving others of their due, for at this time of year the consumption of water is heavy. The commune allows every one to use a quantity proportional to his ordinary needs. You must not exceed this quantity without special authorization, for if you do you will expose us all to the risk of prosecution."

Every one understood. The pupils received a direct and concrete demonstration of the legitimate demands of the society in which they lived. They acquired a practical and vivid understanding of the manner in which, by innumerable ties, their lives were related to the social environment.

It is almost superfluous to say that the commune acceded to the children's request, and that the inauguration of the pond took place on the festival of the birds and the trees. The whole incident will

serve to show how our pupils were instructed concerning the elements of social life.

On the one hand, they definitely learned that the sciences exist for social ends, promoting the progress of the collective life; on the other hand, they came to understand that every act performed by the individual has a reaction upon social life, and that the individual cannot isolate or abstract himself from this environing reality.

Thus moral education, like social education, presupposes the establishment of two essential foundations:

(*a*) The introduction into school life of a genuine social activity which shall vivify, nourish, and inspire the entire programme and all the modes of action, alike physical, manual, intellectual, and moral. The school must subserve the purposes of social life.

(*b*) The organization of the social environment in which the child lives and grows toward maturity. This involves the daily practice of a well-planned social life within the school. To the examination of this second point we must now turn.

II. Self-government—Social Duties

A moral life cannot be inculcated by instruction; virtue is not a lesson which can be acquired by rote. It is achieved through practice, through experience, through the individual use of free-

dom. It is the outcome of self-possession, of self-mastery.

We have shown that in the child the moral nature is not to be evoked by violent means, nor by a crude rigidity of principles, nor by having recourse to artificial sanctions. The only way of securing the desired end is to create around the child an environment and a social life which enable us to dispense with punishments (invariably degrading and humiliating), and to do away with that authoritarian and mechanical discipline which would regulate every impulse and every action, and which only succeeds in producing a passive machine, void of thought and feeling, blindly working in obedience to a rule imposed from without.

Do I mean by this that we have no rules, no regulations, no sanctions?

Not at all. Let me proceed to show how we deal with this question.

One fact is indisputable, that children are much more influenced by one another than they are influenced by adults. The child is subject to numerous suggestions from the social environment. Among these the suggestions emanating from its comrades are the most urgent and the most effective.

If we place a child in an anarchic environment, one lacking coherence, order, and rule, we hand it over to influences which are likely to prove disastrous both to its emotional and to its intellectual nature. To enable us to give children much

liberty, liberty which will render it possible for them to acquire, at their own cost, experience of good and evil, and to estimate the results of their actions, it is indispensable that we should organize the social environment in which they have to live, to grow toward maturity, and to make a moral code by spontaneous effort.

But, let me repeat, this social organization must be the children's own work. This is what we mean by a *régime* of self-government. The pupils constitute a republic within which, in accordance with their respective aptitudes and upon terms of free consent, they share the duties incumbent upon the school society, appoint representatives upon the governing body of the school and the relatives' committee, pass laws, etc.

The objects of this system of self-government are twofold:

(*a*) It permits the organization of the social environment in which the child lives. We can discipline the child's energies. We can guide certain tendencies which, if left to themselves, and in view of the outstanding influence the pupils exercise one upon another, would be injurious.

(*b*) It renders possible the creation of an atmosphere wherein the children, encouraged to spontaneous effort and left to use the means at their own disposal, can become initiated into the practice of a social life well within the compass of their understanding, can effect their social education in the field

of personal experience, and can gain an objective and concrete grasp of their duties and rights as members of a collectivity.

Self-government has been somewhat widely applied in certain institutions without furnishing the anticipated results. This proves that it has not been organized in a manner conducive to success. In some cases the attempts have been half-hearted, transient, and clumsy. In other cases, instead of true self-government there has been instituted a system of rule by monitors with powers delegated from above.

Self-government as I understand it involves the following foundations:

(*a*) The organization of a system of rules, activities, habits, and customs, in conformity with physical and moral hygiene, and thoroughly well ordered.

(*b*) The creation of a genuinely social spirit by means of a wise division of labour, together with the effective and genuine co-operation of the pupil in the school life. The pupil is thereby enabled to practise social life and to acquire by degrees a sentiment of collective life.

(1) *Division of Labour*

At the meetings held at the beginning of every term the pupils allot the duties rendered necessary by the social life of the school. Those who fulfil

the various functions imposed by the division of labour are appointed by the assembly of pupils.

The chief duties relate to the inventory; the care and the purchase of books, produce, instruments, and tools; correspondence with those who supply such necessaries or visits paid to these persons; keeping accounts of all the expenditure connected therewith; the organization of working gangs and the drawing up of a time-table. There is the duty of supervising order and cleanliness in the following departments: the studio for modelling, binding, and drawing; the carpenter's shop; the smithy; the physical and chemical laboratory; the natural history laboratory; the four ordinary class-rooms; the class-room for geometrical drawing; the library and the musical library. Finally, there are the following duties: responsibility for the gardens; care of buildings, purchases and sales, overseer's work, book-keeping for the farm; organization of games; the editing of the school magazine.

Each term the assembly appoints a president, whose task it is to supervize the general order of the pupils, to see that the decisions of the assembly are carried out, to represent the pupils at the meetings of the relatives' committee—in a word, to co-ordinate joint efforts, to establish relationships between the various functions, and to deal with any disputes which may arise.

In addition to these offices held for an entire term, there are others for which rotation is indis-

pensable, so that each pupil may gain certain necessary experience, may acquire the elements of orderly conduct and of cleanliness, and may gain a spirit of initiative and a sentiment of responsibility. Month by month, or week by week, the pupils allot a number of appointments, certain of which, obviously, will be more congenial than others.

Here are some of the offices of monthly tenure: first aid; games—seeing that things are put away, etc.; ordering necessaries; the school journal.

Among the offices of weekly tenure those may be mentioned which concern the order and cleanliness of the following places: the bath-room; the boot-room; the cloak-room; the closets. Besides these there have to be appointed: an umpire for the games; a curator of manuscripts; pupils responsible for the care of the farm beasts and the fowls.

What are the salient features of all this organization? First of all it must be observed that the assembly of pupils possesses almost sovereign powers. Only in very grave cases, where the pupils' inexperience might compromise the educational spirit of the school, do I find it necessary to veto a decision of the assembly. This happens rarely, for with the system of life we have adopted at Bierges, frank, open-hearted, fair, and intimate, we are able, through the intermediation of the elder pupils, to influence and direct to a degree, the decisions of the assembly. With tact, with a great deal of tact, the teachers, assuming the *rôle* of elder comrades, can

prepare the ground by talking matters over and by exchanging views with the young people.

Thus the assembly has something more than a consultative voice. It can come to definite decisions, subject to the headmaster's veto.

In the second place, the pupils who have accepted office for a definite period, for a term, a month, or a week, cannot resign unless in quite exceptional cases, and after the resignation has been discussed and sanctioned by the assembly of pupils. This consecrates the principle that any effort freely undertaken ought to be carried through to its end. It is in the child's own interest, and cultivates patience, perseverance, and strength of will.

Thirdly, the duties are apportioned in accordance with the physical and mental powers of the pupils.

Fourthly, the pupils enjoy extensive freedom of action and initiative in the performance of these various duties, and, this being so, they assume a considerable and genuine responsibility.[1]

(2) *Concentration of Work*

In addition to this co-operation in the social life of the school which is the outcome of the division of labour, the child takes part in the organization of school life, a part perhaps more direct. He helps to organize festivals, lectures, and excursions, and

[1] *Supra*, pp. 49-51.

contributes to the discussion of various questions concerning the internal life of the school. He contributes also to the formulation of the general time-table of class work and manual work, a time-table which is the topic of discussion at one or more meetings of the assembly of pupils, the suggestions of this body leading occasionally to modifications in conformity with reasonable desires. Finally, through manual work and in other ways, the pupils collaborate in the upkeep and improvement of the school buildings, of the materials used in study, of the collections, etc. Numerous examples of such collaboration have already been given.

Beside the social life of the school, on the margin as it were, there are associations founded by the pupils, games clubs, camping societies, and so on. There is the orders office, one of the pupils being entrusted each month in rotation with buying various articles used in school work, such as paper, pencils, india-rubber, exercise books, pens and penholders, blotting-paper, and the like. All these arrangements are made among the pupils, the school staff not interfering in any way. There is also the agricultural co-operative, which tills the school lands.[1]

The reader will have understood for himself that our system of self-government does not apply in all its completeness to pupils from seven to nine years, for these are at a stage of evolution at which the

[1] *Supra*, pp. 64-66.

patriarchal system is, in truth, far more suitable. Since they do not possess and cannot yet possess a plain and full sense of social life, in their case the presiding judge, the high priest, is, not the collectivity, the assembly of pupils, but ' Maman Faria,' or ' Papa Faria,' as they call us. The word of the patriarch, of the father, is supreme. We must walk before we can run. None the less, since mimicry is instinctive, and since the little ones like to resemble their elders and to do the same sorts of things, the younger pupils have also desired to effect social organization. Let us hear how a youngster of nine records the incident:

THE YOUNG ONES

After the Christmas holidays the young ones of the school made up their minds to have a president of their own, and set to work to elect one. It did not turn out well, for every one voted for himself; but when M. Faria explained to us that this was impossible, and was really bad manners, we took a second vote. I was elected president for one month, and I suggested that each pupil do some one duty in our class. One would have the library, another the blackboard, another would keep order in the class, another would look after the stove, the book-case, the flowers, the collections, etc. My comrades agreed. M. Faria has given us the care of some of the animals; we have to feed them, to take them out, etc. Our animals are: a goat, some rabbits, two dogs, thirty hens, some pigeons. Every week

we exchange animals, and exchange the other duties of our class-room. . . .

III. Liberty—Authority—Sanctions—Masters

Outside this social organization, this robust framework of collective life wherein the social sentiment can arise and grow, we cultivate with no less earnestness and ardour the sentiments of initiative, independence, and personal responsibility. We leave much freedom to our children. We have done away with all that authoritative discipline which aims at imposing upon the child moral habits whose rational purpose is incomprehensible. We endeavour to lead each pupil to create for himself an inward rule, the outcome of his individual experience, a spontaneous adaptation to school life, to the social life he leads with his comrades and his teachers. In all departments, in physical training, in manual labour, and in class work, we appeal to active collaboration, to interest, inquisitiveness, initiative, individual effort. There is freedom of movement, freedom of action, creation, organization, research; there is free disposal of everything used in the school. The reader will do well to recall what I have written about manual labour, class work, laboratories; about the principles of our mental education and the means we employ to adapt it to the pupil's capacity, to his physiological and

psychological development. These liberties are real, and they are not abused.

Does this mean that there is no authority? The suppression of punishments which degrade and humiliate does not imply that sanctions have ceased to exist. These sanctions, however, are not artificial, but natural; the child acquires for himself the experience of good and evil. He is free, but he is responsible. Being able to estimate the outcome of his actions, he must, in so far as he is able, repair the injurious consequences of such actions. Those who break things replace them out of their pocket-money; those who have not done their work at the proper time make up during spare hours for their previous neglect; those who have left things untidy, tidy them up; those who have made things dirty, clean them. A pupil who is habitually late has to start earlier. In case of misconduct, the attention is not merely directed to the offender's bad action, but he is reminded of good actions which he has performed at some other time. The contrast illuminates the road; it makes the balance dip on the side of good.

At Bierges the sanctions are prescribed by the assembly of pupils, which votes laws and rules. These thus acquire an impersonal character. Since they are voluntarily accepted by all, all submit to them without ill-feeling.

In a New School that is really animated by the new spirit, where due allowance is made for the dis-

position, the needs, and the character of the pupils, and where the environment comprises all the elements and factors indispensable to the child's development, moral and physical equilibrium is practically invariable. Fresh air, light, space, freedom, physical exercise and manual work, suitable diet, sufficient sleep; a system of mental training and methods of teaching which pay due regard to youthful capacity; a simple, cordial, and frank atmosphere—all these things combine to produce an environment characterized by repose, health, and physical and moral vigour.

The influence of this natural environment at Bierges, very calm, very restful, is all-important.

If, in a New School, we are strict in the enforcement of the principle that no abnormal or backward children can be accepted, every one will gain thereby, and, above all, the children who are accepted.

It is essential that parents should understand that a New School must not be regarded as a dumping-ground, as a last resource for their children when all else has failed.

At Bierges I was not willing to accept every applicant, and pupils as well as parents knew that those admitted were accepted on probation.

I was thus enabled to inaugurate an extremely healthy atmosphere, and within three or four months of the founding of the school its physical and moral life was established upon a thoroughly solid foundation, so that an excellent social spirit reigned.

To the indirect influence of the physical and of the social environment there is superadded the comparatively direct action of schoolfellows and teachers.

For this we depend, in the first place, upon young people who show themselves worthy of special confidence, whom we ask to exercise a direct influence, above all upon the youngest pupils, but also upon those of intermediate age. The seniors thus appointed are chosen by the assembly of pupils, and each of them is asked to take care that two or three specified younger pupils shall be punctual at class and at table, that they shall keep their clothing, underclothing, and books tidy, that they shall have their account books duly posted, and that their exercise books (which the seniors inspect every Saturday) shall be neat and written up to date. Fulfilling these and similar offices, the seniors play the part of elder brothers, training the juniors in the acquirement of the elements of neatness and cleanliness. The senior, in playing his part, learns patience and tact, and acquires social habits of kindliness and brotherliness. The results have been admirable.

It is hardly necessary to say that the influence of the teachers is no less efficacious because it is something very different from the authoritarian and police-like methods of the old pedagogy, by which the child was regarded as a delinquent in constant need of correction.

Where the *régime* is frank, cordial, and open-

hearted, you regard the master simply as an older comrade, a trusty and far-sighted friend, one who feels with you, who understands you, who is interested in your personality, your life, and your occupations. The child considers the master a big brother of much experience, who plays with him, works with him, and laughs with him; not a dictatorial pedant, not an usher ever on the watch, a policeman taking notes, a strict and unfeeling judge, a hateful gaoler. For the school is not a prison. The pupil of the New School does not lose all liberty of acting, thinking, and feeling. In such an environment the master's influence is much more comprehensive; its effects are more certain, its results are happier.

It is touching to see how readily at Bierges the pupils come to us in their difficulties. We advise in a spirit of friendly and affectionate persuasion, a persuasion exercised either directly or indirectly, and thus induce the child to make an effort which will lead to the spontaneous realization of the possibilities of progress. Whenever circumstances make it our duty to intervene, to apply a sanction, we are careful that this sanction shall be simultaneously adapted to the nature of the child, to the nature of the action he has performed, and to the nature of the attendant circumstances. Above all, we make sure that the sanction shall be understood by the pupil, so that he may feel its usefulness, and may recognize the logical, apt, and harmonious

relationship between the fault and its redress. Anything beyond a natural and logical sanction would be a degrading punishment, inducing a sense of humiliation and a spirit of revolt.

Let us suppose that one of the pupils is wanting in orderliness, cleanliness, attentiveness, diligence, desire for work, kindliness, altruism, or brotherliness. We must give him a position in which he will acquire, develop, and strengthen the habits and sentiments wherein he is deficient. There are plenty of suitable posts in a school where the system of self-government is comprehensively and intelligently applied.

Do not discourage children, but help them onward. Here you have the key-word; help the child to become better.

The best way to ensure this is by literally following the fine precept of moral hygiene enunciated by Adolphe Ferrière. We must act in such a manner "that positive sanctions abound rather than negative sanctions; that joys are commoner than sorrows, regrets, and vexations, which lessen energy and rarely have a good result." [1] We must appeal to sentiments of wholesome pride and self-respect, sentiments which will have a tonic influence; we must not overwhelm by an atmosphere of reprobation. We must show that the fault is the fruit of an accident, that it is not an organic disease, and that patience and steadfastness will enable the pupil to

[1] *Projet d'École Nouvelle*, p. 50.

control his own individuality. This is why at Bierges we teach the children to watch their own progress, to measure their growing strength, to compare the mental work or the moral effort they are now making with those they have made in the past. We lay especial stress upon this individual emulation, without, however, neglecting the factor of social emulation, which, if tactfully utilized, may become a powerful lever of moral education.

We offer rewards, but not as a lure which deforms the morality of effort. No sort of bargain is struck between pupil and teacher before work is begun. Moreover, the reward must not immediately follow the realization of the effort, for it is undesirable that the teacher should seem to be honouring a draft drawn by the pupil.

Thus the choice of reward is a matter requiring tact and finesse. Let us suppose that one of the pupils has just finished a piece of free work, something individually chosen, in which he has been interested. He has put his back into it and is gratified with himself. But the personal satisfaction at duty fulfilled does not suffice; he requires in addition the encouraging approval of others. Approval will be still more precious if it materialize in action or as a gift. This may take the form of a book treating the subject that has been studied, some implement useful for his work, or a holiday which will afford rest after labour. But these actions must be performed, these gifts must be

bestowed, tactfully. It is not enough to give; we must know how to give.

In the second chapter[1] I mentioned that at Bierges we have another institution whose results have seemed to me peculiarly gratifying.

In order to develop the child's critical faculties to accustom it to self-control and self-examination, and also to strengthen its sentiments of fairness, justice, and kindliness, we undertake once or twice every term a public appreciation of the work and the conduct of each pupil, the person chiefly concerned and his comrades having to speak and to give their opinions.

In the discussions that ensue the pupil is led, not merely to compare his present individuality with his past individuality, to make an examination of conscience, to look back upon the route he has traversed and to estimate what his efforts have accomplished, but he is led also to appreciate his comrades, to learn, that is to say, to be trusty, frank, just, forbearing, and kindly. All who have taken part in these discussions have been greatly impressed by them. The child's psychological insight, naturally profound, gains in depth, and there becomes associated with it a charitable and tolerant spirit by which its value is greatly enhanced.

As already explained, there are seventeen teachers in the school, including two master-craftsmen, the

[1] *Supra*, p. 103.

blacksmith and the carpenter. Seventeen teachers for twenty-five pupils! Many are surprised at these figures, and it is suggested that a school must be financed by a benevolent millionaire if it is to be staffed so generously—or else that the teachers must be grossly underpaid. But neither of these suggestions bears any relation to the facts.

With one exception, all my fellow-workers live out. In the majority of New Schools it is otherwise, but we prefer our method for the following reasons:

(*a*) First of all our school retains a homelike character, which it would lose if we were compelled to board a number of teachers.

(*b*) We avoid the difficulties which frequently affect the social life of a school from imperfect adaptation of the masters, when these live in, to the school domestic environment. This lack of adaptation leads almost inevitably to overt or hidden discords which may hamper the work of education.

(*c*) Our system permits the teacher to lead an autonomous life in an environment distinct from that of the school. He enjoys his own domestic, moral, and intellectual existence, retaining complete personal liberty and independence of mind. The enjoyment of these possibilities is all the more essential because educational work is extremely absorbing and exhausting. The teacher should be enabled to reinvigorate himself daily in an

environment suited to the vital needs of an adult.

(*d*) We gain in addition something of extreme importance, alike in the matter of instruction and in that of education in the wider sense. The teacher who does not live in the school brings into it a fresh and vivifying current from the wider spaces of the outer world; he is ready to combat automatism and routine, which are always to be dreaded in an environment unduly stable and homogeneous. Our teachers furnish the school with numerous and varied impressions, suggestions, observations, and data; and they do this all the more effectually because they live in Brussels, a centre of vigorous, intellectual, moral, and social life.

(*e*) Seeing the way our branches of work are grouped and concentrated, the teacher who visits the school for one, two, or three days a week, spends the greater part of the day there, mingling in the life of the pupils, joining them at meals, and participating in their games. His influence being, as it were, spaced out and not uniformly continuous, induces richer and more varied reactions, because there is more interest and more charm in relationships which, though frequent, are not permanent, as are the relationships of those teachers who live in. Since the value of life depends not upon the quantity but the quality of its hours, teachers and pupils lose nothing in respect of mutual knowledge and reciprocal understanding.

Our experiment at Bierges has, in this respect, yielded results with which we are entirely satisfied.

IV. Taste—Art—Music—Singing

The formation of the child's taste, its æsthetic initiation and education, are among the most interesting of the problems with which a teacher has to deal when he is organizing the life of a school.

How can we awaken and strengthen a feeling for beauty in children? What means are available for this purpose?

In this case, too, it is obvious that we must not attempt measures isolated from those which constitute the general organization of school life. Since materials and opportunity for awakening and forming a child's taste occur everywhere, we must effect æsthetic education apropos of everything and of nothing. The pupil's mind should inhale beauty, just as his lungs inhale the pure country air.

Love of the beautiful, love of the true, and love of the good constitute the sacred alliance of the moral powers. Just as in respect of the other activities or manifestations of child life, so here it is impossible to isolate the formation of taste, to isolate æsthetic initiation and artistic culture, from the totality of school life.

Day by day we have a thousand opportunities of directing a child's attention toward some beautiful object, or, in the case of some other object, of show-

ing why it is regarded as ugly. But we have to take into account the age of our pupils, and it is obvious that the same methods of initiation and of æsthetic culture will not suit all alike. It is clear that very young children will gain nothing, as far as the formation of taste is concerned, from visiting a picture gallery, from seeing sculpture, from listening to a concert, or from attending a dramatic performance, if we present them with matters quite beyond their grasp. Their intellectual development is insufficient to enable them to appreciate the value of such things.

Artistic education may be either direct or indirect. As a foundation, we must have training in orderliness, in cleanliness, alike in the private rooms and class-rooms, and as concerns exercise books, lockers, books, and general behaviour. It is here that we must begin in matters of æsthetic culture. It is commonplace; it is simple; but it is fundamental.

We aim first, therefore, at orderliness and neatness; we concern ourselves with the organization of the home in which the child lives and grows. While we are speaking of the house, of the interior, let me point out that at Bierges we have everywhere plants, reproductions of pictures and statues, and numerous engravings—things to attract attention and to charm.

In addition, some of the work that our pupils do, the best among their drawings, paintings, models,

carvings, etc., give us valuable assistance in the matter of school decoration.

Outside school we are at home with nature, in the fields, among trees and flowers, inexhaustible treasuries of pleasurable emotion. If we teach a child to observe nature, we are taking the first step to induce the study, the admiration, the love of nature. We are opening the heart to all the delights, those of line, colour, form, and sound.

Gardening, flower culture, outdoor reading, walks, excursions, camping out in the woods, observation and study of natural phenomena—how memorable are the sensations and emotions thus achieved! Our life at the school is a perpetual round of them.

We live in the very heart of nature. I have previously told you that the natural surroundings of the school are picturesquely beautiful.

Of all our festivals, the nature festival, the festival of the birds and of the trees, is the chief. Let me briefly describe it.

It is organized by the pupils and comprises the following items:

(*a*) The liberation of birds, bought by the pupils with their own pocket-money from bird fanciers. Here we have redemption, deliverance from prison. At our last festival the liberation was preceded by a few well-chosen words, composed, written, and recited by pupils selected for the purpose by their comrades. It was a touching occasion and several among the adults present were genuinely moved.

(*b*) Placing of artificial nests in the trees. These nests had been made by the senior pupils in the carpenter's shop and presented by them to the juniors, who, for their part, had decorated the interior of the nests with charming and ingenuous inscriptions addressed to the birds.

(*c*) The reading of compositions written by the pupils about trees, poetical recitations, choral singing, and music. A delightful festival, well suited to children, and leaving most agreeable memories.

Let us return to the question of the formation of taste.

Our teachers awaken and form the taste of their pupils through the medium of cardboard work, modelling, drawing, water-colour painting, and oil-painting.

Every year the pupils organize an exhibition of drawings, paintings, models, artistic work in wood and wrought iron, the fruit of the year's labour. Some of the objects are genuinely beautiful. This exhibition has been christened by them the 'Salon des Indépendants,' and their friends and relatives visit it in large numbers.

Among our favourite methods I must mention frequent visits to museums and to exhibitions of painting and sculpture. On these occasions the senior pupils are accompanied by artists who are friendly to the school.

The seniors, for whom we take subscription tickets, regularly attend the great monthly con-

certs given in the Brussels Opera House, and they also attend literary *matinées* to witness the performance of classical dramas and choice works by modern playwrights. In addition we have at school courses of lectures and debates in which the pupils participate, and where they acquire fresh elements of artistic initiation. I must also mention dramatic performances organized by the junior pupils. Finally, all are taught singing, and the choruses add grace to the festivals and concerts which we organize at school.

As has been shown, there is no lack of opportunity in the field of artistic education.

Two questions remain to be considered, that of sexual education and that of co-education. The reader is doubtless aware of the extreme importance of both.

V. Sexual Education and Co-education

At Bierges the sexual question is treated tactfully and frankly. A child living in the country undergoes in these matters an easy and wholesome initiation. The breeding of animals, gardening, flower culture, afford him a natural introduction to phenomena and problems of this character. His teacher leads him to observe these phenomena and explains them, doing so with the same simplicity with which the pupil is led to observe and to understand the other phenomena of organic nature. When he is old enough our medical men advise him

concerning all the problems of individual and social hygiene bearing upon the matter.

A child living under the *régime* which obtains in our school, one living much in the open air, nourished by suitable food, free from stimulating ingredients, with daily tubs and shower-baths, engaged in manual labour and physical exercises of various kinds pushed to the point of agreeable fatigue, participating in games and sports, and having a programme of mental activity which does not entail overwork, but involves genuine and wholesome exercise of faculty alike in the moral and social sphere, and whose training includes a natural and frank knowledge of sexual hygiene—such a child is likely to enjoy perfect physical and therefore perfect moral health.

Passing to consider the co-education of the sexes, its advantages are so obvious to me that I am strongly in favour of the method. I have just been reading with much interest the arguments of the advocates and of the opponents of co-education, and also the judicious and objective views expounded by Adolphe Ferrière in an article which may be commended to those interested in the subject.[1] Ferrière here discusses the question with the mastery, the good sense, and the skill which he invariably displays about educational topics. Nevertheless, much as I favour co-education, I have not hitherto been able to introduce it at Bierges.

[1] "Coéducation et Mariage," *Foi et Vie*, June 1 and 15, 1914.

I have to await a more favourable moment. In a country where educational questions are debated with extraordinary acerbity, and where there is absolutely no precedent for co-education, it would have been dangerous to complicate the launching of the new venture with an experiment which could not have failed to add greatly to the difficulties (sufficiently numerous in any event) attendant on the foundation of the first New School in Belgium. But it has always been my intention to introduce co-education as soon as the school, in virtue of its authority, its experience, the results to which it could point, should be in a position to carry through this reform. The opponents of co-education have three principal grievances to urge against the advocates of the method. They complain that co-education is desired for motives of economy, they assert that it tends to overwork girls by subjecting them to the same *régime* as boys, and they declare that it diverts the members of either sex from the ideals proper to that sex. But actual experience in schools where co-education is carried out under proper conditions justifies the belief that the tendency of the method is to ensure the normal evolution of both sexes; this experience shows that the mixed school, far from diminishing or extinguishing manliness in the boys and womanliness in the girls, encourages the regular development of the qualities respectively comprised under these terms. The tendencies and aptitudes proper to each sex are

not mutually exclusive, but are complementary qualities, so that the members of each sex require constant association with individuals of the other, and in this way only can there be avoided a one-sided development of intellect and character.

Boys and girls gain by living together. As Burness points out, comradeship, life in common, common interests, tend to encourage mutual sympathy and understanding, while attenuating and retarding the appearance of sexual nervous tensions.

The result of co-education is to establish a frank, wholesome, and affectionate *camaraderie* between boys and girls. It does not hinder the normal evolution of the tendencies, aptitudes, mental powers, and dispositions characteristic of the respective sexes, but tends rather to promote favourable reciprocal reactions. Finally, it enables young men and women to know one another, to collaborate, and to practise mutual aid. For this reason it furnishes one of the conditions most likely to lead to happy and healthy marriage.

VI. Summary and Conclusion

I am satisfied that I have been advancing along the right road. I am convinced that the methods employed and the life lived at Bierges enable children to develop under the most favourable conditions possible. At any rate, our pupils were exceedingly happy. Parents assured me that their

sons were impatiently awaiting the end of the holidays and the return to school. In the school magazine one of the writers, enumerating the reasons which have led to the issue of that publication, remarked:

Another thing is that we wish to make our school known and to make known the new methods which are used in it. We take pleasure in our work here and are happy. Those who, like myself, have been at other schools understand the difference better than those who have not. We should like more pupils to enjoy the advantages of this fine and pleasant life.

What results have we secured? Since the school has been in existence for two years only, it is impossible to claim permanent conquests, or to contend that it has exercised a decisive influence upon the moral and intellectual growth of our pupils. I should be the last to deny that in many instances a good school and the individuality of its headmaster may be competent to secure the immediate realization of the germinal promises latent in a child. In general, however, educational work cannot produce its full effect until the element of time has been superadded to the other indispensable factors.

The reader will forgive me if I quote some extracts from the letters of a young man who spent two years with us at Bierges, and whose development there

was exceptionally gratifying. When he first came to the school he was impulsive and dictatorial. If faced with difficulties he lacked energy of will; he was prone to discouragement and, though by no means wanting in intelligence, was inclined to desultoriness and lack of concentration. Through a sustained effort of attention and application he was enabled, during two years spent in our cordial, kindly, and well-regulated environment, to acquire the qualities of orderliness, calm, self-possession, strength of will, and clarity of judgment which make a man of him to-day.

Here are three of his letters, two from Scotland and the third from Paris.

(1)

STIRLING: *January* 17, 1915

DEAR MONSIEUR FARIA,—I can hardly find words to tell you how delighted I was to get your letter yesterday. I was at the office when it came, and I was not able to read it until half-past two in the afternoon, which only enhanced my eagerness. I have now read it and re-read it more than once, and have found it extremely encouraging and instructive. The impression it gives me is one of hope and of great optimism. I see you thirty kilometres from the firing line, making arrangements to open a temporary school. How splendid of you! . . .

What a lot we shall have to tell one another when we meet.

A NEW SCHOOL IN BELGIUM

Now I will give you a few words on my new life and on my adventures since I left you.

I spent two glorious months at Oxford, months which contributed greatly to increase my knowledge and to form my mind. During the first month I attended the vacation courses for foreigners, coming and going on my bicycle. I was living in a charming little village about five miles from Oxford. The country was magnificent, and every morning I enjoyed a delightful panorama of the town, of its historic colleges, of its churches, etc. This city is one of extraordinary interest; everything there has its history, every ceremony its ancient tradition.

We had three or four lectures daily. These lectures, courses for the most part, were extremely instructive. The subjects were varied: English literature; historical grammar; the political, industrial, and social life of England; the English colonial system; education in England. I took a great many notes. The lecturers were among the most celebrated and the ablest of the university professors. Twice a week, in the afternoon, visits to the colleges and various excursions were arranged.

In my free hours I got on well at tennis, and several times I went boating on the river, which is beautiful.

I organized my life very regularly, keeping an exact record of how I spent my time. Eight hours sleep, eight hours work, and eight hours recreation. Two days a week I worked only six hours and played ten hours, these being the tennis days.

This jolly time soon came to an end. By the

middle of September I had lost all hope of returning to Bierges, and I wanted to volunteer for service. Following my father's advice, I gave up this idea for the present and started looking for work. It was not easy to find anything. I wrote to all my acquaintances in England, and heard from one after another that they knew of nothing. I put two advertisements in the paper, and went to see five or six influential people, farmers on the large scale, but all without success. At length I received a letter from a Scottish merchant who had business relations with my father, telling me that one of his employees had enlisted and that I could have the vacant place. I wrote to ask the salary, and as soon as I had heard from him again I made my way to Stirling, arriving there on October 1st, feeling thoroughly out of sorts, I don't know why; but I was all right after a week. I took a bed-sitting-room. You can walk the length of it in two strides and can cross it in one and a half. The bed is eighteen and a half times too large and the pictures are awful. The east window looks over neighbouring roofs and chimneys and also over the stables of the adjoining house. It's a charming view; quite poetic!

The landlady does my room and cooks for me. I pay fifty-six shillings or seventy francs a month for lodging, board, and light. No fire except on Sunday evenings, as it would be too expensive.

The firm for which I work deals in grain, hay, and straw. There are ten of us in the office and we work from half-past eight in the morning to the same hour in the evening, and sometimes to nine or half-past.

The only breaks are half an hour for dinner and

twenty minutes for tea. The rest of the time we work without intermission, and very hard indeed. We send out from 150 to 200 letters daily and buy and sell from 10,000 to 13,000 cwt. of grain every week. Add 100 to 150 tons of hay every week and you can imagine how busy we all are.

Most of the employees start early to the markets of the neighbouring towns, some of them going as far as seventy-five miles from Stirling, and they do not get back until five in the evening. Then comes the busiest time of the day, the correspondence. I write very few letters as yet, but I copy letters and write the addresses.

In the morning I work in the office, posting the books and examining samples, until half-past eleven; then I go on my bicycle to visit neighbouring farms, three or four miles away, to buy newly threshed corn. At one or half-past I have dinner, and then I set out for more distant farms, buying corn and hay if there is any, selling oilcake, bran, chemical manures, etc. At five o'clock I return to Stirling, have tea, and stay at the office until quite late. In the evenings, three times a week, I give lessons to civilians and officers who are going to France. The officers pay nothing, but the civilians pay enough to eke out my salary, so that I am no expense to my parents.

There, dear Monsieur Faria, you have a few details about my life. As you see, I am far too busy to suffer from boredom. Lately there has been a considerable change. In October I felt as if I were quite alone in the middle of a gloomy forest. The people here are extremely reserved and talk very little. They are closely shut, as it were, and ex-

pand only to their intimates. At first I knew no one, but I have gradually got to know quite a number of people. I have a thousand things more to write to you, but it is very late, so good-bye. . . .

(2)

STIRLING: *April* 25, 1915

DEAR MONSIEUR FARIA,—All is well with us here. The spring is later than at home, but it is delightful when it comes. The trees are budding, and the whole country-side is reawakening after the long winter. . . .

I have somewhat altered my plan of life. For nearly two months I have been rising at five or a quarter past and going to work in a garden I have rented for ten shillings. It is about three miles from the town, in the neighbouring hills. I have done all the work myself, carting manure, digging, and sowing. The garden is about half the size of the kitchen garden at Bierges. . . .

For the last three weeks I have had a second garden. It belongs to a friend who is too lazy to cultivate it himself. I work a third of it for him, while the rest is at my own disposal rent-free. . . .

As you see, I am greatly interested in my gardens, and I spend two hours there every morning, as well as Saturday afternoons. . . . I think of giving the produce to an institution for children or to a hospital filled with convalescent soldiers, as a contribution to the upkeep of this institution during the war, in which I have not hitherto been able to take an active part. . . .

In the evenings I still have seven civilian pupils, in three classes, and also a class of officers. . . .

Here you have a brief description of my life. I hope that you will be pleased with me. I should like to show that I have been under your influence for two years. . . .

(3)

PARIS: *June* 15, 1915

DEAR MONSIEUR FARIA,—I can't tell you how pleased I am to know that my brother is to join you. I am sincerely grateful to you for undertaking to make a man of him. I am filled with hope now that he is to be under your care, for I know all that I have learned from you, and I shall never forget what I owe to you. Before I left Bierges I did not fully realize the benefits you conferred on me, but I understood well enough as soon as I was left to my own devices and when difficult times came. Had it not been for my experience at Bierges, brief as it was, I should never have known how to organize my life so as to make it active, wholesome, and interesting. I have to thank you for having made a man of me.

I left Scotland to enlist. The arrangements are nearly finished. On Monday I shall be in uniform and then I will send you my photograph. I am to join the Engineers. I can't say that I look forward to life in barracks, but I shall get along all right. What I really want is to go to the Front as soon as possible, so that I may take an active part in this gigantic struggle for the life and the liberty of those I love.

My task is ended.

Bierges was no more than a laboratory for patient and continuous investigation. It makes no claim to perfection.

If, in an unfortunate hour, it should assert any such futile claim, this would signify that, having lost its animating vital impulse, it had become a poor little prison of formulas, systems, and dogmas.

We keep our windows open to all the winds of heaven. Our minds are alert, and we wish to respond to every summons from the future. We are alive. Or, rather, since the war has made us exiles from our spiritual fatherland, it would be better to say, we have lived. But we can confidently add, we shall live again.

The school at Bierges was an experiment, a place for unceasing analysis; but it had also a synthetic and idealist aim, and was quite free from meanness or vulgarity. A small working community, a source of delight, it enthusiastically collaborated toward the advent of a better life. Sombre and lowering as has been the outlook at times for us in our exile, we have never lost our confidence in the permanency of the values which man has created through the centuries, values which will be safeguarded and enhanced by a truly humanist education.

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